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RAILROAD GAZETTE

A JOURNAL OF TRANSPORTATION, ENGINEERING AND RAILROAD NEWS

(Established in April, 1856. The preceding bound volume had "46th year" on its title page, and the present volume has "48th year," which is more nearly a correct statement.)

FORTY-EIGHTH YEAR

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1903

RAILROAD GAZETTE

FRIDAY, JANUARY 2, 1903.

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Contributions

The Most Northern Railroad.

Helgeland, Norway, Oct. 25, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You will find the writer's name on your subscription list, hence a little party of engineers from Utica and Albany who are up in this high latitude were able to read in *The Railroad Gazette* of Sept. 19 all about "The most northern railroad."

However, the article in question was in error regarding the "imaginary" character of that line from Malmberget or Gellivare to the Ofoten Fjord. That line is now completed, and is to be opened to traffic in about a week. Its western terminus is at Narvik, where open water is always available. I thought you might like to know this, and also that we are building a railroad and harbor here that will be "a good second" for the title of the most northern railroad. Our harbor is here at Mo-i-Ranen, on the easterly extremity of the Ranen Fjord and about ten miles south of the Arctic Circle. From thence our railroad—standard gage—will extend northeasterly about 17 miles along the Dunderland River to one of over 700 iron mines owned by the Dunderland Iron Ore Co., Ltd., of London. The line is now nearly graded, and will be completed next season. We shall also build a crushing, separating and briquetting plant with a capacity for 2,500 tons of briquettes at first, but that is to be doubled eventually. Mr. Edison's processes for crushing and separating the ore will be used and perhaps his process for briquetting.

All the weather conditions described in your article also obtain here except the actual sight of the midnight sun, which is hidden from us by a high mountain. During June, July and August our work progressed night and day without any artificial light.

Now it is quite dark at 5 p. m., and as we expect to spend the winter here we also expect several new varieties of weather. The sun will disappear from our sight in about ten days to reappear Feb. 22.

The average rainfall is about 72 in. It's a queer country, and we all feel it will be a great day when we get our next glimpse of "Liberty Enlightening the World."

HERSCHEL ROBERTS.

Four-Cylinder Balanced Compound Locomotives.

Lafayette, Ind., Dec. 1, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As a result of the publication of my paper on "Possibilities in the Design of American Locomotives," in the *Railroad Gazette* for October 17, I am in receipt of two letters of such general interest that I venture to send you the substance of them. In doing this, I violate no confidence, and serve a useful purpose in disclosing something of the interest which is now being taken in the principle underlying the four-cylinder balanced compound, which principle it was one of the purposes of my paper to exalt. I should add that in the paragraphs which follow, I have purposely refrained from comments, preferring to transmit in brief form that which has been submitted to me.

Referring to the communications in the order in which they were received, the first is from the distinguished French engineer, M. Mallet*, best known to American technical readers perhaps as the designer of the Mallet type of compound locomotive, which has found extensive use in Europe both upon standard and narrow gage track. From the several drawings sent me by M. Mallet, representing the balanced engine which he now proposes, I have selected two (Figs. 1 and 2) for reproduction. The first shows the manner in which the design works out when there are two coupled axles, and the second, when there are three coupled axles.

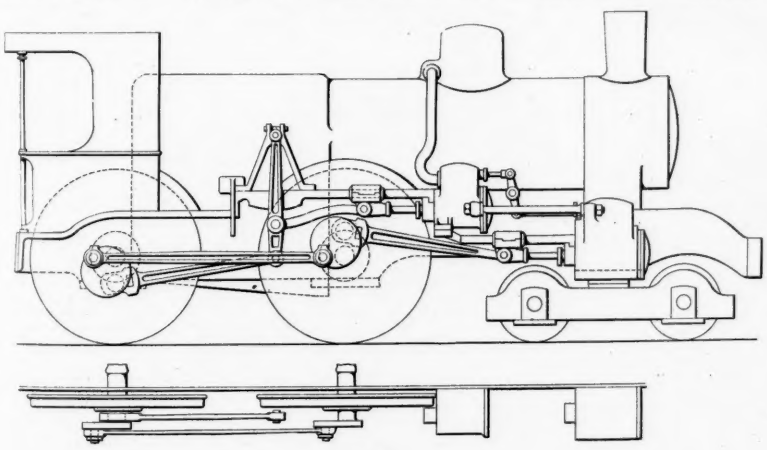


Fig. 1.

The controlling idea is the same in both of these designs. In both there is a high-pressure and a low-pressure cylinder on each side of the engine. The motion of the piston of the high-pressure cylinder is opposite that of the low-pressure cylinder, and hence the reciprocating parts, if designed to have equal weight, are perfectly balanced. Referring especially to Fig. 1, it will be seen that the coupling rod connecting the driving wheels is attached through return cranks, the pins of which are at right angles to the main crank pins. It should be noted, also, that in the working out of the design, counterweights (not shown in the drawings) are placed in the wheels to balance the revolving parts, namely, the crank pins and return cranks, the coupling rod, and a portion of the main rods. Since, therefore, the design makes provision for balancing both the reciprocating and revolving parts, the engine is to be regarded as a balanced engine. M. Mallet claims the following advantages for his design, in comparison with the arrangement of inside and outside cylinders of the de Glehn compound.

1. The absence of cranks on the front driving axle, hence the distance apart of the coupled axles may be decreased.
2. Both driving axles are similar and interchangeable.
3. The center line of the two cylinders, on each side of the engine, being in the same vertical plane, the balancing of the moving parts is easily realized.
4. The necessity for a delicate and costly crank-axle is avoided.
5. The relative arrangement of the several parts is sufficiently simple.

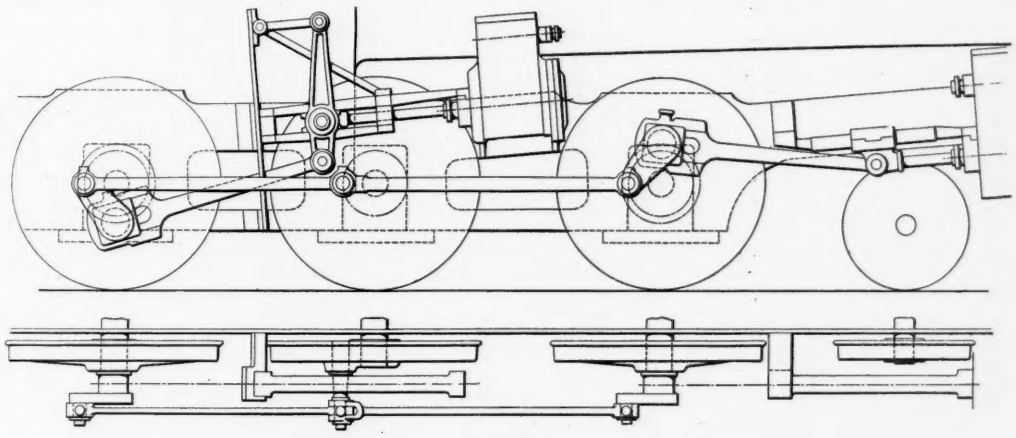


Fig. 2.

The second communication to which I have referred is from Hagan's Locomotive Works of Erfurt, Germany†. Here, as before, I select two drawings for reproduction (Figs. 3 and 4). It will be seen that this design, while involving straight axles requires a return crank for the coupling rod on one axle only. In Fig. 3, the main rod of the forward cylinder moves between the rear cylinder and the frame, while in Fig. 4, both cross-heads are carried back of the rear cylinder. Obviously, the design permits perfect balancing. The advantages claimed for this type of design are stated as follows:

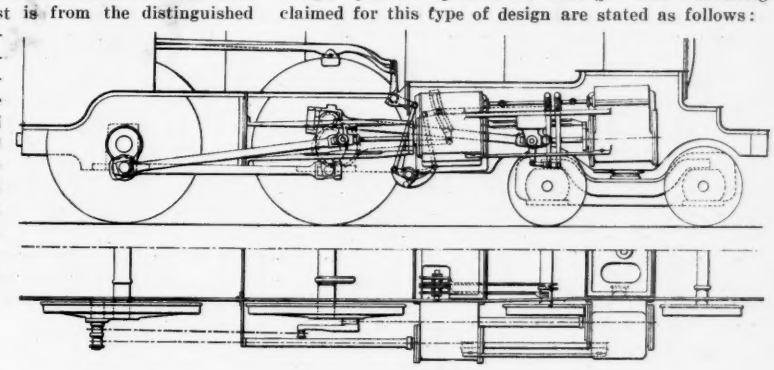


Fig. 3.

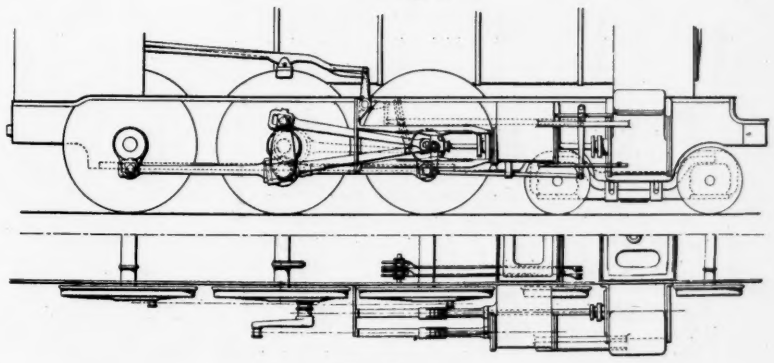


Fig. 4.

1. There is no crank axle.
2. The driving mechanism is outside of the frame and the valve gear may be outside if it is desired.
3. The cylinders of each side are arranged tandem, and are connected with each other by strong rods which, in view of the fact that the forces acting within the cylinders are opposite, permit them to be held with a greater degree of security than is otherwise possible.
4. The horizontal distance between the center line of the high-pressure cylinder and that of the corresponding low-pressure cylinder is very much less than in four-cylinder compounds having two cylinders inside of the frame and two outside of the frame, and hence rolling movements will be much less.

W. F. M. GOSS.

*A. Mallet, Engineer, 30 Avenue Trudaine, Paris.

†Locomotivfabrik Hagans, Erfurt.

The Essentials of a Good Draft Gear.*

BY E. M. HERR, *Manager Westinghouse Air-Brake Co.*

The term "draft gear" is frequently used to mean either the whole or some important part of that portion of a car through which the stresses, occasioned by either pulling or pushing the car by its drawbar, must pass to the car framing. It seems, therefore, important to first define the term "draft gear."

My definition would be the broad one covered by the statement already made, viz.: The draft gear is that part of the car transmitting to the framework of the car body the pulling and pushing stresses imposed upon the drawbar. This draft gear is composed of three essential parts.

1. The drawbar with its yoke and followers or other means of transmitting pulling and pushing stresses to the second or yielding portion of the draft gear.

2. The yielding portion, usually a spring or substitute therefor, interposed between the drawbar and attachments and the third or fixed portion of the draft gear.

3. The fixed portion or draft gear attachments to the framing of the car.

Having now the draft gear composed of the drawbar, the yielding portion, and the attachments to the car, what should be said to be the essentials of a good draft gear.

This more than any other part of the car structure is subjected to severe shocks and stresses both of tension and compression. It is, therefore, manifest that great strength is of prime importance. A designer with the object of the greatest possible strength in the draft gear would make the drawbar of the strongest possible material, see that its attachments were also of the proper cross section to withstand fully as great stresses as the bar, and that they were secured to the car framing firmly with bolts, keys and other accessories arranged to distribute the stresses transmitted to the car sills as advantageously as possible Such a design would leave out entirely the second or yielding portion of the draft gear because it is much easier to attach a drawbar to the car framing directly than by interposing a spring or other yielding member between the drawbar and the car. Not only this, but were pulling and pushing stresses only to be considered, the interposition of this spring would surely make a weaker and less secure attachment. Is this yielding portion then a non-essential to a good draft gear which can be omitted or have we failed to consider some condition affecting its design?

Slight consideration will disclose the omission. The pulling and pushing strains imposed on the drawbar are not gradually applied but generally come as shocks or blows. It is well known that the destructive effect of a blow is greatly increased when it is delivered against a rigid body and correspondingly decreased when the thing struck is yielding. It is, therefore, clear that another essential of a good draft gear is interposed yielding resistance.

It was formerly supposed that if this yielding portion of the draft gear was equal to or slightly in excess of the tractive effort of the locomotive hauling the cars, ample provision had been made. Were the strains imposed upon draft gear never greater than the tractive power of the locomotive drawing the train, a yielding portion of the draft gear equal or slightly in excess thereof would be sufficient. Unfortunately for the simplicity of our design, this is not the case. Owing to the enormous weight of modern cars and locomotives, these bodies when once set in motion have in themselves, by reason of such motion, an amount of energy or capacity to exert strains and stresses in their draft gear compared with which the tractive power of the most powerful locomotive is small. Witness the ease with which trains are often broken in two, three or more parts in passing through sags or over "hog backs."

The forces which cause this damage are not gradually applied on the draft gear. They usually come as blows caused by bodies of great weight moving with moderate velocities. In fact, the weights of modern cars and locomotives are so great that unless the speed with which they come together is moderate, no draft appliance even with the greatest possible amount of yielding resistance interposed, can withstand the shock. In fact, as instanced above, their strength is sometimes exceeded usually because of yielding resistance of inadequate capacity.

It is of great importance to keep carefully in mind the difference in effect produced by the impact of bodies moving with different velocities. We are as likely to reach erroneous conclusions in designing draft gears if we reason from the effect of impact from bodies of too high as of too low velocity. Not only, therefore, is the yielding portion an essential part but it is so essential that no draft gear without it could long endure. It is also evident that the amount of yielding resistance formerly adequate becomes entirely inadequate with the heavier cars and locomotives and the stronger and more rigid car bodies now used.

Can this greater yielding resistance be obtained satisfactorily by simply increasing the number or strength of the springs formerly used with good results? Within certain limits only can this be done, for it must be remembered that when a spring is compressed it contains an amount of stored energy capable of doing work or increasing stresses in the parts confining it just as surely as the moving body of the car or locomotive itself. The strains these springs are able to and do exert are practically equal to the force which compressed them. Inasmuch as cars must be run in trains, where the draft springs act one upon another the cumulative effect of the recoil of a number of such powerful springs massed at some point in the train, would result in stresses so high that the other parts of the draft gear could not withstand them even if such stresses were not increased, as they often are, by the power of the locomotive drawing the train. This action often results in the breakage of couplings when long trains especially of empty cars are stopped at high speed by an emergency application of the air-brake.

It is, therefore, essential not only that the yielding portion of the draft gear be of large capacity but that it should have little reaction or recoil.

Now, having the strongest possible drawbar properly arranged with an adequate amount of yielding resistance with minimum recoil, the third or fixed portion of the draft gear should be made of the strongest available materials and secured to the sills of the car in such a way as to bring the heavy strains of pulling and the still heavier buffing stresses upon the parts of the car best adapted to receive them.

No specific rules can be laid down as the design of cars is different. The disposition of the attachments so the various stresses come on those parts of the car which can best resist them, is the great essential. It is also essential that the draft gear attachments, or the so-called fixed portion should be so designed as to admit of proper inspection and facility in making repairs or renewals.

The essentials of a good draft gear, therefore, are:

1. A drawbar of the strongest material to resist blows, jerks, etc., with secure attachments to transmit stresses received.

2. Adequate yielding resistance with minimum recoil, securely housed.

3. Fixed attachments to the car, strong and well-designed for ease of inspection of the gear, and well secured to the car so as to distribute and dispose of all stresses as advantageously as possible.

BY ROY V. WRIGHT, *M. E., P. & L. E. R. R.*

The fact seems to be generally recognized that the ordinary spring draft gear is too light for the heavy service now required of it. The high capacity cars, and the large locomotives now generally used, and in the case of the steel cars, the stiff construction, have shown it to be defective in many respects. A careful study of the conditions and requirements to be filled lead us to believe that the following are some of the essentials of a good draft gear.

First.—A capacity of at least 100,000 lbs. That is it must have a yielding resistance amounting to this much, but it must be able to stand a blow of several times this amount without injuring it.

Second.—A total drawbar movement of at least 2 in.

Third.—A good drawbar movement under ordinary pulls.

Fourth.—A small amount of recoil compared to its capacity.

Fifth.—It must be substantial. Repairs, except for unfair usage, should not be necessary. Parts should be of a simple and substantial design, and as few in number as possible.

First.—The Standard M. C. B. draft spring has a capacity of 19,000 lbs. The twin spring and tandem spring arrangements would therefore have a capacity of 38,000 lbs. The tractive power of the large freight locomotives now generally used is greater than this.

The following is a quotation taken from the report before the Western Railway Club on tests made with the Westinghouse Dynamometer Car by the Lake Shore & Michigan Southern Railway Co.:

"From the general results of the tests, it is believed that the tensile strains in draft gears with careful handling will frequently reach 50,000 lbs., with ordinary handling 80,000 lbs., and with decidedly rough handling, fully 100,000 lbs., while the buffing strains can be placed at 100,000, 150,000 and from 200,000 to 300,000 lbs., respectively. In extreme cases, the buffing strains will go considerably above the last named figure."

With these facts in view, it would seem necessary to have a better cushion than is accorded by the present standard rigging, and this opinion is strengthened when we examine the repair bills and note the damages which would probably not have occurred if a better draft rigging had been used.

Second.—The present standard draft rigging allows a total drawbar movement of 1¾ in. This should be greater, in order that the mechanical energy may be more easily absorbed, and it would not seem wise to have it any less than 2 in.

Third.—There must be a good drawbar movement under ordinary pulls, in order that heavy trains may be easily started. If the draft rigging is too stiff, it is quite evident that it will be harder to start the train, and where the locomotives are loaded to their limit, as is now the common practice on many roads, it would, in many cases, necessitate handling a lighter train.

Fourth.—The recoil of a spring is very great compared to its capacity, therefore if we had a spring rigging with a capacity of 100,000 lbs., the recoil would be so great as to be destructive. While it is therefore advisable to have a small recoil compared to the capacity, it would be well, when the rigging is under a load of say one-third or one-fourth its capacity, that the recoil be large compared to the force upon it, for this reason: When an engine starts out with a heavy train, it will often be noticed that after the engine has gone forward a few feet, it will come to a dead stop, and for a few seconds, appear to be stalled. When the recoil of the spring takes effect, it assists the engine and it will move forward.

Fourth.—There seems to be a general opinion abroad that friction draft gears which, of course, come nearer filling the above conditions than spring gears, are not substantial enough, and will go to pieces or will give out after they have been in service awhile. Following the general principles of mechanical design, it would seem that a rigging designed with few parts, of a simple design and a durable material, and having large friction surfaces, ought to give satisfaction, provided such a rigging could be produced.

*Papers before the Railway Club of Pittsburgh, Dec. 26, 1902.

The New York Central Terminal.

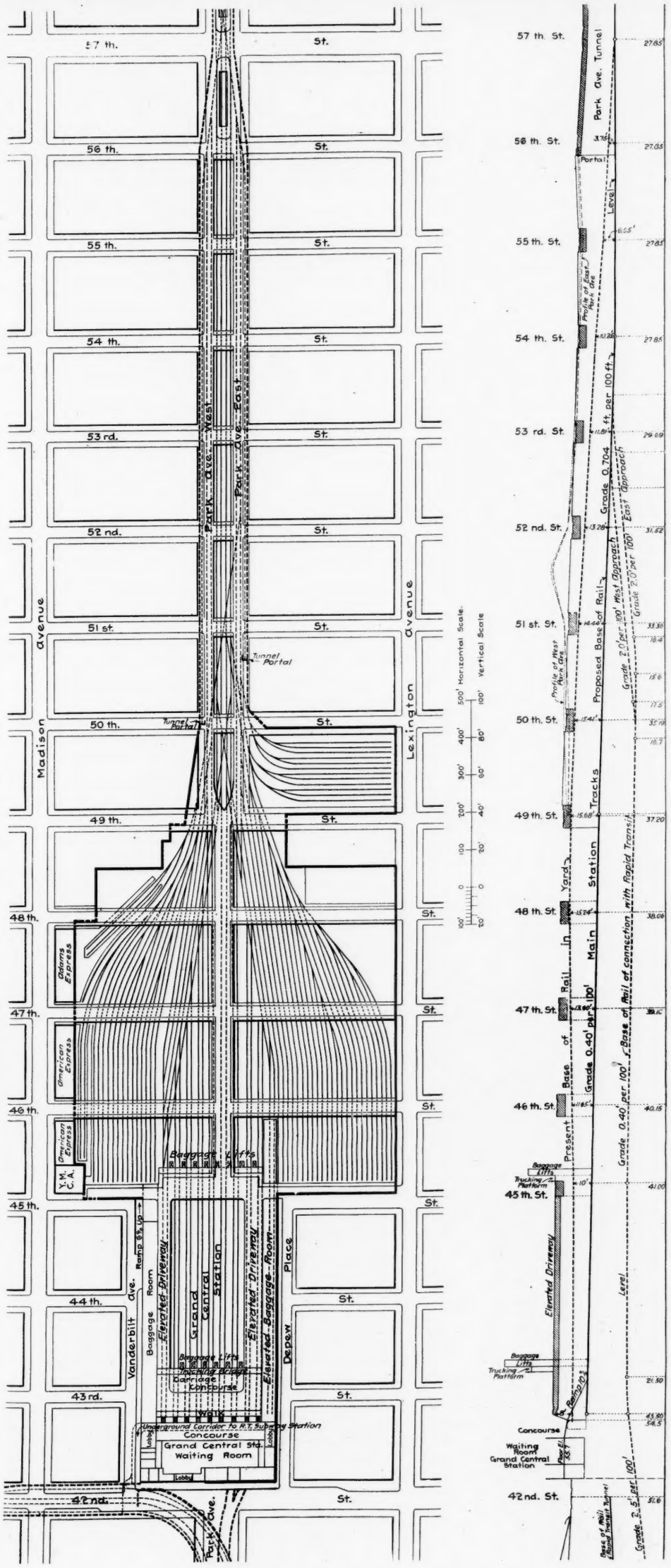
The committee appointed by the Board of Estimate and Apportionment to consider the plans and propositions of the New York Central & Hudson River and New York & Harlem companies for changes at the 42nd street terminal, presented its report under date of Dec. 22. This report has been unanimously accepted by the Board, and action will at once be taken upon it by the railroad companies. It calls for three tracks on each side of the present tracks from 57th street south. Beginning at about 57th street all of these tracks will be depressed, going under the present summit and taking out a grade of 1¼ per cent. southbound which now exists. In the train-shed these tracks will be 7½ ft. below their present level and 10½ ft. below the floor of the concourse. The profile shows the location of the ramps, by means of which passengers will reach the train level. Vehicle traffic will be removed from the 42nd street entrance and will pass out of 45th street directly to a large covered plaza which will be well above the tracks. Here passengers, with their baggage, will be discharged or taken up. This will serve to distribute passengers coming and going over a very long front, as the present entrance will be retained. The concourse will be widened 20 ft. and the annex train-shed will be replaced by an arched glazed roof, so that all of the 18 or 20 tracks contained in the train-shed will be under one roof. The main waiting room will be extended through to Vanderbilt avenue and nearly doubled in size and the yard room will be practically doubled, while underneath the concourse there will be a corridor connecting with the Rapid Transit Subway trains. Baggage will be handled by endless belts. The storage yard will be extended east to Lexington avenue and the great increase in yard room will cut off most of the empty car movement to and from the Mott Haven yards, which, in itself, will constitute a great addition to the capacity of the tunnel and viaduct approaches.

Two changes have been made in the plan, which was described in our issue of Dec. 12, of which one is of great importance. The Board recommends that Park avenue be continued southward (as shown in the drawing), over the yard to a connection with the elevated driveway at Grand Central Station, in order to take as much vehicle traffic as possible away from the crowded surface streets. This would practically add a north-and-south avenue, at a point where one is greatly needed, since Park avenue under present conditions is "bottled up" at the lower end and is of very little service in relieving the congestion of Madison avenue.

The other change made by the Board is the refusal of the privilege to maintain vault spaces beneath the sidewalks at different points around the yards, chiefly upon Lexington avenue. It was feared that vaults so situated might some day interfere with the building of an east side tunnel by the Rapid Transit Commission.

The report of the committee is too voluminous to be published here in its entirety, but certain extracts are reprinted. After describing the original plan, which called for a widening of Park avenue and the closing of portions of a number of cross streets, and which was "unacceptable either to the neighboring property owners or to the members of the board," the plans of Dec. 3, previously mentioned, are reviewed. The essential points are the depression of yard and station tracks, the building of adequate bridges to carry the cross streets over, in place of the foot bridges now in use; the extension of the yards and station to Lexington avenue, on the east, and the low-grade terminal arrangements. The proposed improvements are attendant upon the change of motive power from steam to electricity, and the companies offer to make the railroad changes at their own expense, asking of the city free use of the sub-surface of the streets and the building of the bridges and viaducts. A comprehensive plan for the removal of grade crossings in the Bronx is further offered by the railroad companies, and will be fully described in a subsequent issue of the *Railroad Gazette*.

A number of objections to the proposed yard changes were made by property owners, and the chief opposition was encountered by the proviso that the crossing of the yards should, in the case of five streets, be effected at a maximum grade of 4 per cent. The committee reviews this question at length, and consider that the disadvantage occasioned by the 4 per cent. grade is less serious than the inconvenience to the traveling public and additional



The New York Central Terminal Improvement.

expense which would be involved if the track depressions were made sufficient to obviate the grade. A list of 28 grades of 4 per cent. or more, in various parts of town, is appended, to show that this percentage of rise is neither unusual nor a serious impediment to travel. The grade of Madison avenue between 41st and 42nd streets, for example, is 5.6 per cent., and grades in excess of 4 per cent. are found on Fifth avenue between 34th and 36th streets, on Park avenue between 41st and 42nd streets, and in many other localities.

The question of compensation to be paid the city is taken up in detail, and occupies a number of pages in the report. In answer to opinions frequently expressed that the payment should be upon precisely the same basis as that to be made by the Pennsylvania, the committee points out the essential difference in conditions; that the Pennsylvania gains a terminal, whereas the New York Central at the conclusion of its large expenditure will have gained no source of additional traffic, but merely increased facilties for handling the traffic which already exists, and these increased facilities will prove of greater benefit to the public than to the railroad company.

The recommendations of the committee, including their decision in regard to compensation to be paid by the railroads, are printed below, as summarized in the report:

"1. That the vault spaces under sidewalks about the station and in Lexington avenue be not granted in this connection.

"2. That the grades shown and the general plans of the railroad companies, both for Park avenue, the Grand Central Station, and for the elimination of the grade crossings at Morris Heights, Fordham Heights and High Bridge, and its plan *b* for the elimination of grade crossings in the vicinity of Kingsbridge, including Kingsbridge road, East 230th street, Broadway, Corlear street, Tibbet avenue, West 230th street and West 227th street, under the provisions of Chapter 516 of the laws of 1901, be generally approved; except

"3. That Park avenue be continued by a 60-ft. viaduct from 49th street to 45th street.

"4. That the railroad companies engage to prepare at once plans for the elimination of their only remaining grade crossings in the Borough of the Bronx, to wit, on the Port Morris branch of the Harlem road, and when said plans are approved by the city, to execute the same.

"5. That if the execution of any of the aforesaid plans create any legal liability on the part of the city or the railroad companies to any property owners, the railroad companies shall pay the same and save the city harmless therefrom.

"6. That it be recommended to the rapid transit commission to consider favorably plans for the connection of the subway at 42nd street with these railroad lines, and also for the connection of the 42nd subway station with the Grand Central Station, and that the railroad companies ask for these connections of such commission.

"7. That the railroad companies pay the city an annual rental of $25,000 for the use of the sub-surface of streets shown on their plans, south of 57th street and Park avenue, except as to vault privileges as provided in the first recommendation; assume all the expense of building the bridges and viaducts from 45th to 56th streets, inclusive, except for the additional width of the 45th street viaduct, and less the sum of $600,000, determined as the cost to the city of acquiring and building equivalent street space; contribute the land for the city to build the Park avenue viaduct provided for in the third recommendation; and in all other respects bear the costs and charges involved, and as stated in their proposition of Dec. 3, 1902.

"8. That upon such bridges and viaducts may be erected such signaling apparatus as may be necessary to the safe operation of the railroads, and which cannot be placed or used in the yard or station below, the plans for which shall be first approved by the Mayor and the President of the Borough of Manhattan.

"9. That the entire action of the city herein is conditioned upon the railroad companies procuring, assenting to and aiding the city to procure all legislation necessary to carry these plans and propositions into effect in their entirety and without modification (except such as the city voluntarily accepts), and which legislation shall also permit and require the change of motive power from steam to electricity or some other motive power not involving combustion in cars or motors by all the railroads now or at any time hereafter using the tunnel in Park or Fourth avenue, which permission and requirement shall contain, however, a proviso that in an emergency arising from a breakdown of the motive power used, through trains only may be temporarily operated by steam, the emergency in each case to be determined by the Mayor of the city.

"10. That the changes herein involved shall be commenced within 30 days after such legislation is had, prosecuted diligently and finally completed within five years.

"11. That no power-house (except stations for the transformation of electric current) shall be placed on Manhattan Island more than two blocks from the water front, except with the consent of the Board of Estimate and Apportionment, and that the location of all such power-houses shall be first approved by the Board of Estimate and Apportionment."

The Buffalo, Rochester & Pittsburgh has made advances in the wages of practically all of its station and trainmen, and, according to the newspapers, the increase averages 7 per cent.

Rate-Making and Its Causes.*

With the opening of the first transportation line, the rate problem had existence. At first, competition was unknown, but, as population increased, and exchange of commodities became more general, rates, first made on the basis of what the traffic would pay, were very soon influenced by the competition of other carriers, and gradually the field widened. Water transportation became a strong factor, transporting commodities in larger quantities and with more regularity. Following this, came the more modern method of transportation, by steam railroads, which slowly extended their lines as pioneers throughout the western part of our country. Some railroads were built through sections where no other lines were in operation, the only means of transportation being by horse or mule, and rates established, which, though much greater than most roads find themselves enabled to charge, were so much less than the residents tributary to the new road had been formerly obliged to pay for the more primitive means of transportation, and were hailed by the patrons as eminently satisfactory. The rates under these conditions are seldom continued. As the rail facilities increase, means of communication with other localities increase to such an extent that expansion of trade begins at once. The farmers find they have so much more extended markets that they must raise larger crops to supply the increased demand, for their market, before the railroad was built, was closely limited by cost of transportation.

In turn the railroad finds it can enlarge the scope of its influence and increase its business in a remunerative way by reducing its original rates, and thereby enabling its patrons to further enlarge their market territory and correspondingly increase their crops and products. It is in the competitive field that rate-making becomes a problem. This statement, which all traffic men know to be true, shows at once that there is a fallacy in thinking rate-making a science.

This competition is not altogether between transportation lines. Commodities and markets are each great factors in the competitive field, and many changes in rates, which on the surface seem to be the result of keen competition between transportation lines, are primarily caused by trade conditions. I believe that in time these two elements will be conceded to have greater influence in establishment of rates than rivalry or competition of transportation lines. When this is fully acknowledged many of the troubles now harassing the railroad interests with respect to interstate commerce will be removed.

The two kinds of competition furnish a sure leveling of rates which all railroads have experienced. The constantly decreasing rate per ton miles necessitates a continual increase of tonnage and an adoption of economies which will produce net revenue to pay interest on the investment and proper dividends on capital. Take as an instance of the application of rates for varying distances, the corn rate from Kansas City to Texas common points: say Fort Worth influences, by reason of competition of markets, the rate made from Denver to Fort Worth, which mileage is 305 in excess of the former.

As an instance of the lack of science in the making of rates, and the results often occurring, I will cite an experience of some years ago. The merchandise rates from Chicago to Missouri River points (Kansas City, Omaha, etc.) form the basis of the Missouri River rates. St. Louis and other Mississippi River points are given a graded scale of rates to Missouri River points below the Chicago-Missouri River rates, and vice versa the rate from Chicago to Missouri River is on the same scale above St. Louis to the Missouri River.

The rates between St. Paul and the Missouri River are practically the same as between Chicago and the Missouri River, and the rates between Chicago and Milwaukee on the one hand, and Ashland and Duluth on the other, while not based on the other rates, are somewhat higher. A line made a very low rate on some commodities from St. Louis to Kansas City which was followed by a Chicago line making a similar reduction to Kansas City and Omaha. This was followed by a similar reduction from St. Paul and Duluth to the Missouri River, and resulted in a similar reduction, eastbound, from the Missouri River to St. Paul and Duluth. In turn, this caused the lines from Chicago and Milwaukee to Ashland and Duluth to reduce their rates, and the result was a reduction of the rates from points in Wisconsin to Ashland and Duluth, a distance of perhaps 200 miles, because of the first reduction in rates from St. Louis to Kansas City, a locality distant from the Wisconsin territory several hundred miles.

Traffic officials have, however, in the last few years, made great advances toward a science of rate making, because conditions and experience have shown clearly the necessity of carefully considering the result, and statistics of traffic movement now prepared and the statements of earnings given are studiously scrutinized, to learn where economies can be practiced and how traffic can be more satisfactorily handled with a view to more net revenue. *Results* are now much more carefully looked for, and the traffic official who does not secure good results is not considered with favor.

In former years, the lack of such information which is now so easily procured, as to facilities of operation, tonnage statistics, density of tonnage by districts, relative earnings on commodities, and on traffic as a whole, caused the traffic men to work without any rule for making rates, but the cry was always "more tonnage," and little thought was given to net revenue.

The traffic man should know what and where are the faulty places on his road as relates to transportation and use of power, and in making rates or negotiating with other lines, make use of that information for the benefit of his company, and in exchange of courtesies or reciprocation in making rates, that same information will benefit his competitors. While we are all selfish, the business conditions of this era make of us broader-minded men than of years ago, and most men do appreciate the reciprocity idea when it is used by an honest man. In times gone by it was unusual to see the Transportation and Traffic Departments work harmoniously, while now, that department which will not be brotherly soon experiences a change of staff. In old times a traffic man would have been astounded to receive a statement showing the freight ton miles for a given month, while now he looks anxiously for such statements, which show monthly the detailed movement of the various commodities his road handles, the average haul, the rate per ton mile, and so much valuable information that this concentration of knowledge of the detailed items of his traffic may be likened to a tally-ho driver, holding in his hands the lines for guiding a string of horses, each line giving him direct communication with the transportation power.

*Abstract of a paper presented to the Rocky Mountain Railway Club, Dec. 20, 1902, by Mr. C. L. Wellington, Traffic Manager, Colorado & Southern.

The Engineer.

At the last meeting of the St. Louis Railway Club Professor W. F. M. Goss, of Purdue, gave an illustrated address entitled "The Training of an Engineer; or the Work of Students in a Technical School." He gave a circumstantial account of the equipment of an engineering school, and of the course of instruction followed there. We have no doubt that a good deal of this will be new to many railroad officers who have not had the fortune to see much of the modern engineering school. Those who graduated 25 years ago from what was then a good school have but an inadequate notion of the completeness and severity of the modern courses, unless their interests or their duties may have led them to see considerable of the modern schools. Below is a paragraph quoted from Professor Goss's paper.

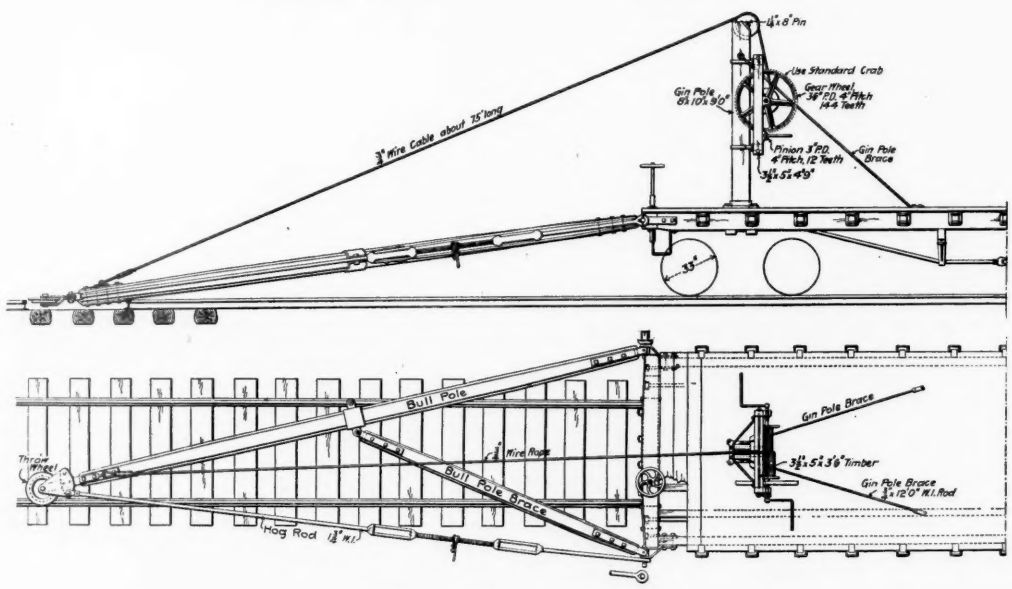
"I have thus far sought to show the character and dignity of the engineer's work. It will, of course, be understood that in this day of specialization no one man is expert in all of the several departments of engineering. That is impossible. But whatever his chosen field, he is always to be accounted a public benefactor. His ingenuity and skill are the starting point which leads to the employment of all the artisans who fill our shops and factories; his work makes possible the peace and comfort of household life, the success of social and business affairs, and it often serves to furnish inspiration for modern thought and to give direction to its tendencies. He may connect, by a bridge, two cities on opposite sides of a gulf, and may receive his price, but as decades pass and generations make use of that bridge, the service of the engineer goes beyond any price. Or again, he may improve travel so that an hour may be saved in a journey between distant cities, and may be paid for his work, but as years go by and hundreds of thousands save that hour, the value of the service rendered becomes enormous as compared with the amount received by the engineer. His calling is exacting. His responsibilities are often great. He is required to act with skill, and he must command the confidence of all who depend upon him. He must have something of a prophet's vision and at the same time be able to analyze details. These attributes, added to a sense of the responsibility imposed by the opportunities for their exercise, lead naturally to useful and ennobling service. It is to such service that the true engineer aspires.

"We may now consider by what means men are trained to be engineers. The inquiry leads in this day to a technical school and while we shall not attempt to follow our candidate for the engineering profession in all his wanderings during a four years' college course, we may inquire as to his studies, and occasionally see him at his work."

The Creese Railroad Track Mover.

In the *Railroad Gazette* for 1899, page 796, was given a description of a device for moving railroad track by locomotive power without loosening the ballast. Since that time the device has been improved and we present herewith an illustration showing the present form. It will be seen that the essential feature is the bull-pole, having at its end a wheel which presses sidewise against the ball of the rail. A rod made adjustable by turnbuckles and attached to the opposite corner of the car from that to which the bull-pole is attached, holds the latter in position. A brace attached to the same corner of the car as the rod and meeting the bull-pole midway of its length gives the required stiffness to the latter.

When a section of track is to be thrown over the ballast is removed from the ends of the ties, though not from the middle of the track, and a small section of track is moved over by a jack or other means, the desired distance. At the end of the car to which the pole is attached is an upright post about 9 ft. high, having a pulley at the top. Over this pulley a rope passes, which is used to raise and lower the bull-pole. The latter is lowered into position against the proper rail of the section of track already moved by hand, and the locomotive started. The car may be moved forward or backward with equally satisfactory results. Track may be moved in the opposite direction from which the bull-pole is set by simply changing the point of attachment of the latter to the other side of the car. The device may be applied to any flat car.



The Creese Railroad Track Mover.

One of these devices has just been completed for the Chicago & Western Indiana and an exhibition of what it will accomplish was given on that company's tracks in Chicago last week. Mr. David C. Creese is the inventor and patentee of the device. His headquarters have recently been moved to Chicago.

Fire Hazard of Electrical Apparatus.

A fire broke out in the power house of the Helena Light & Traction Company at Helena, Montana, on the evening of October 20, demolishing the building and nearly all of the machinery, the exception being a number of oil-insulated transformers which were practically uninjured. The building originally contained a steam plant which has been abandoned, power being purchased from the Missouri River Power Company, which supplies power from Canyon Ferry, 18 miles distant, over a double 11,000 volt circuit. The effects upon the high-tension apparatus of the Missouri River Power Company installed in the station may be summarized as follows:

The high-tension switchboard, lightning arrester equipment, and, in fact, everything but portions of the six 11,000-volt, 150-k.w., Westinghouse transformers, were totally destroyed. However, two of the transformers were not upset, and, being oil insulated, their vital parts were protected from the fire. The oil did not burn away sufficiently to injure their coils or cores, and it is probable that it would not have ignited at all had not the covers been removed from the cases before the fire to facilitate cooling, the transformers being worked at a heavy over-

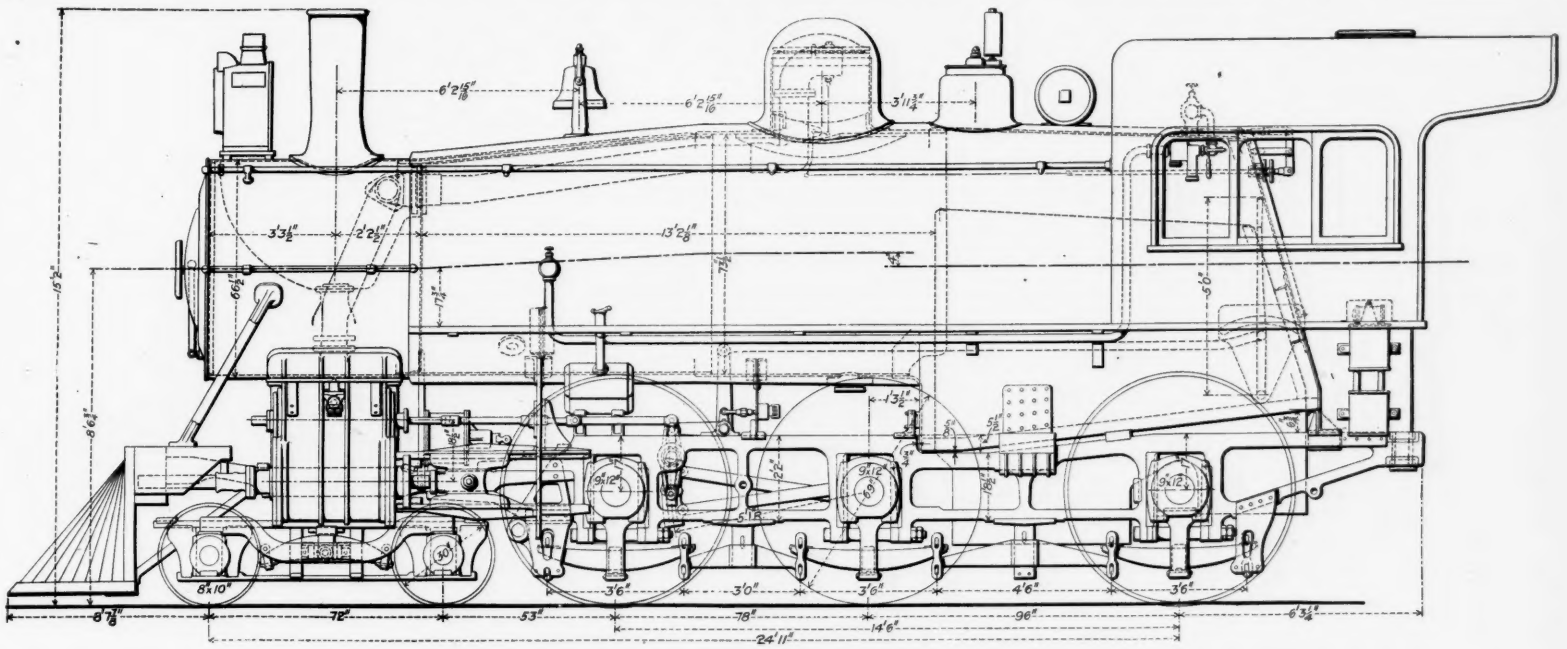
load. The four other transformers were standing on a wooden floor and as soon as the latter was burned away they were upset and poured their oil into an engine pit below.

There were also in the station two 100 h.p. induction motors driving, through a line of shafting, six direct-current arc-light dynamos. The arc machines were totally destroyed but, from the report of the appraisers, it appears that the induction motors were damaged only to the extent of 50 per cent. of their value. Although the marble distribution switchboard of the station was completely destroyed, there were found behind it three oil-insulated Westinghouse potential regulators in cast-iron cases, which were practically uninjured, the damage appraised being $20 to provide handles, cable terminals and cleaning up.

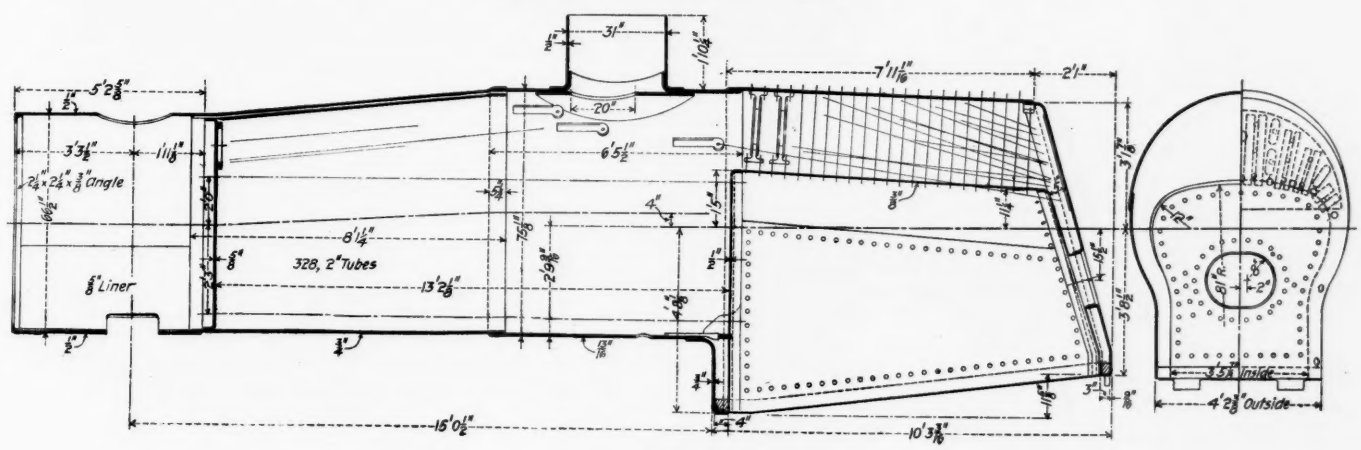
The results of this fire indicate that oil-insulated transformers are more immune from injury than almost any other kind of electrical apparatus.

Ten-Wheel Passenger Locomotive—Canadian Pacific.

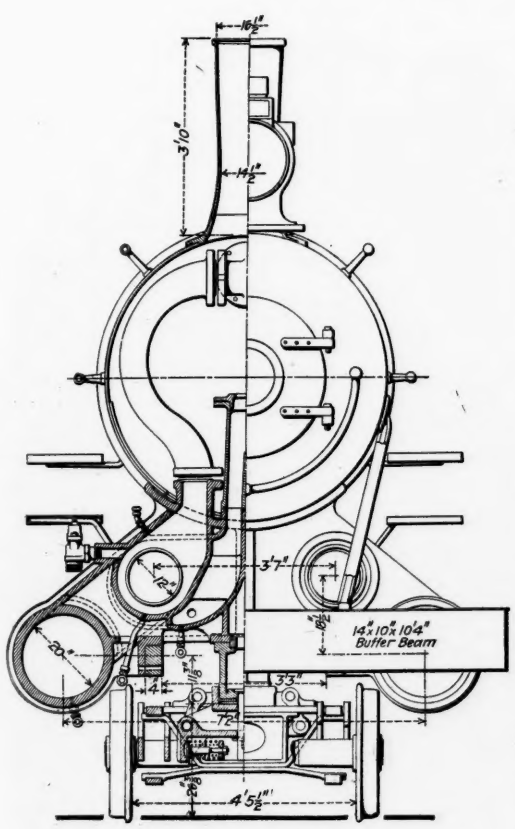
We illustrate herewith, a 10-wheel passenger locomotive built by the Canadian Pacific at their Montreal shops. The first was put in service last August and at present six in all are running and are reported to be giving excellent results. There are six more under construction besides 12 which are being built from the same drawings by Neilson, Reid & Co., of Glasgow, Scotland.



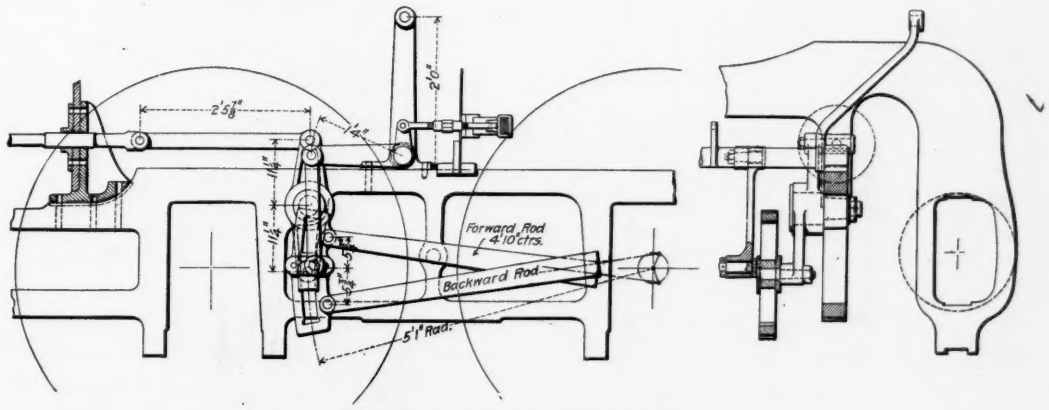
Elevation of Canadian Pacific Engine.



Boiler.



Transverse Section Through Cylinders.



Valve Gear—Canadian Pacific Engine.

The new engines have piston valves with inside admission and outside exhaust, the incoming steam having a direct course from the dry pipe as is shown by the transverse section through the cylinders. The cylinders are simple, 20 in. in diameter, and have a stroke of 26 in., giving a total cylinder volume on each side (neglecting displacement of piston rod) of 9.45 cu. ft. The maximum tractive effort assuming that 85 per cent. of the boiler pressure of 210 lbs. is available at starting, is 27,000 lbs.

Some of the typical ratios are as follows:

Weight on drivers divided by maximum tractive effort	4.7
Weight on drivers divided by heating surface	52.4
Total weight divided by heating surface	68.0
Heating surface divided by grate area	73.0
Tube surface divided by fire-box heating surface	14.2
Heating surface divided by cylinder volume	256
Grate area divided by cylinder volume	3.5

	Simple.	Compound.
Total weight, lbs	164,550	165,475
Weight on drivers, lbs	126,750	126,125
Heating surface, tubes, sq. ft	2,262	2,263
Heating surface, total, sq. ft	2,421	2,416
Diameter of drivers, in	69	69
Grate area, sq. ft	33.2	31

The engines were designed by Mr. E. A. Williams, Superintendent of Rolling Stock, and Mr. A. W. Horsey, Chief Draughtsman. The details have been worked out with considerable care and possess a number of interesting features. In point of total weight, weight on drivers, and heating surface they are almost identical with the 10-wheel compounds described and illustrated in our issue of Aug. 15, 1902, as will be seen by referring to the following table:

The valve gear was given particular attention so as to get it straight and do away with the motion connection bar. This has been accomplished by placing the piston valves in line with the center of the frames and using a rocker which rocks on a pin fastened in the frame. The valve stem passes through a guide box fastened to the frame close to the forward drivers. The spring gear is under hung and is central with the driving journals.

The boiler is the extended wagon top type and is radial stayed. It contains 328 2 in. tubes 13 ft. 2⅛ in. long. The fire-box is 9 ft. 6 in. long and 3 ft. 5⅞ in. wide, and is made of Otis steel.

The cab is steel and conforms to the Canadian Pacific standard design. The tender frame is also the standard design with turtle back hopper tank. The tender frame is very strong, 10 in. steel channels being used in the underframe. The tank has a capacity of 6,000 gallons and the coal capacity is 10 tons. The air pump is fastened to the frame beneath the cab.

Automatic Block Signals on Southern Pacific Single Track Lines.

One of the most interesting installations of block signals on single track that has been described in the *Railroad Gazette* is that of the Southern Pacific (San Joaquin division), of which we gave an illustrated description in our issues of March 8 and July 19, 1901.

As these signals, with others on the Coast Division of the same road, constitute the second largest installation of this kind, we have asked an officer of the road for a report of his experience with the signals, and the substance of his reply follows:

Automatic block signals have been used on single track on lines of the Southern Pacific for a period of two and one-half years on the Coast Division out of San Francisco, and for one and one-third years on heavy grades over the Tehachapi Mountains on the San Joaquin Division. In the latter case the speed of trains is generally slow, but on the Coast Division during the last year the line equipped with these signals has been traversed by an average of 47 trains daily, most of which were very high speed passenger trains. On the latter division there are 50 home and two distant signals, controlling the movement of trains over 13 miles of single track with 28 continuous blocks.

Trainmen are instructed to report to the Superintendent all signals they may find at danger, and all delays that may be occasioned thereby. Signal foremen make a daily report of all signal failures, stating cause and reason for delay to trains. During the last year only 26 delays to trains were reported as having been caused by signals at danger, the minimum delay being five minutes and the average eight minutes.

The rules on this portion of the road require that when a train is stopped by a signal at danger it must wait five minutes and then proceed under full control, not exceeding six miles an hour, under protection of a flagman over those portions of the road where the view is obscure.

Very little difficulty is occasioned by having to flag, as in most cases, except in very foggy weather, the view between signals or the length of the lock is unobstructed and the engineman can flag from his engine.

In despatching trains the automatic signals are only considered as an extra precaution by the trainmen, the train rules controlling the movement of trains being same as over sections of track that are not equipped with the signals. The conductor of an inferior train would not run in face of a superior train, depending upon the automatic block signals to protect him from collision, because he would know that he had no right to go unless his movement was covered by an order from the despatcher or by time-table rights.

The block signals are so arranged, with preliminary and overlap track circuits, that it is impossible for two trains from opposite directions to enter a block section without running past a danger signal. Two trains approaching each other in opposite directions, when nearing a block signal section, will both find the signals at danger; and under the rules would meet each other within the block with speed under control or under the protection of their flagmen. To avoid all possibility of accident, superintendents enforce a strict compliance with the rules that the train finding a danger signal must stop, wait the full time indicated by the rules, and then proceed under full control, being protected by flagmen until the train passes out of that block section.

On the mountain section of the San Joaquin division there are 30 miles of single track and 23 continuous blocks with an average of 30 train-movements daily. On this section the rule is for down grade trains to wait five minutes and up grade trains two minutes, and then proceed with train under full control under protection of flagman, the train speed on this section of the line being much slower than on the Coast division. Experience on this division is similar to that of the Coast division, except that flagging is more difficult, therefore causes more delay. This is because there are many curves and tunnels on this portion of the road.

The result of the company's experience with automatic signals both on the mountain districts and in level country is declared to be very satisfactory, and the officers "consider them a valuable adjunct to the safe and economical operation of trains on single track."

SOUTHERN PACIFIC COMPANY—FAILURES OF AUTOMATIC SIGNALS; YEAR ENDING JUNE 30, 1902.

Coast Division, San Francisco to San Bruno.

13 miles single track.
28 continuous blocks.
41 Standard Signal Co.'s signals.
11 Union signals.

Cause of failure.	Number.
Outside influences, malicious mischief, etc	33
Fault of inspectors and attendants	10
Fault of sectionmen	10
Faults of mechanism	11
Failures of primary battery	1
Failure of storage battery	1
Defective bonding	1
Defective insulation	1
Broken battery jars, overhead line troubles	7
Cause not found	17
	92
Failures per month	7.8
Failures per signal per year	1.77
Train movements per signal failure	179.

Trains were stopped on account of broken rails, open switches, trains and cars on sidings not in to clear, trains in block or on overlap, 7 times.

San Joaquin Division, Caliente to Tehachapi.

30 miles single track.
23 continuous blocks.
51 Union Switch & Signal Co.'s signals.

Cause of failure.	Number.
Outside influences, malicious mischief, etc	3
Faults of inspectors and attendants	10
Faults of sectionmen	15
Faults of mechanism	3
Failure of storage battery	3
Defective bonding	6
Defective insulation	2
Broken battery jars, overhead line troubles	12
Cause not found	2
	56
Failures per month	4.6
Failures per signal per year	1.1
Train movements per signal failure	195.6

Trains were stopped on account of broken rails, open switches, trains and cars on sidings not in to clear, trains in block or on overlap, 24 times.

British Westinghouse Electric & Manufacturing Company, Limited.

The third annual general meeting of the shareholders in the British Westinghouse Electric & Manufacturing Company, Limited, was held, on the 12th Dec., at the offices, Westinghouse buildings, Norfolk street, Strand, London, Mr. George Westinghouse (the chairman) presiding.

The Chairman said: My colleagues have delayed this meeting of the shareholders to enable me to preside. I regret the delay, but, as a matter of fact, I was giving attention to matters of far-reaching importance to your company up to the last moment before sailing. . . . Manufacturing operations on a considerable scale are now being conducted at your works in Manchester, where all further orders for electrical machinery, steam turbines, and gas engines will be executed. These orders include the eight 5,500 k.w. turbines and generators for the Underground Electric Railways Company of London, Limited (including the District Railway), and the three 3,500 k.w. turbines and generators for the Metropolitan Railway Company, besides the entire steam and electrical apparatus for the Clyde Valley Power Company, the contract for which is mentioned in the report of the board. There are now employed in your works at Manchester about 3,000 operatives, who, under experienced supervision, are rapidly becoming familiar with new methods of manufacture and the use of special machine and other tools which your works manager has so ably selected. There is every reason at present to expect that the costs and rate of production will be entirely satisfactory to your managers, who believe that by careful instruction your workmen will learn to use your valuable machine tools as well as similar ones are used in Pittsburgh.

That many of the best workmen of the district are seeking employment in your works is not unnatural. . . . For nearly 30 years it has been a common saying at Pittsburgh that the best workmen have preferred employment at some one of the Westinghouse plants, because all of those works have been of modern construction, and particular attention has always been given to the welfare of the *employes*.

. . . During the past year the business of those companies, i.e., the Westinghouse Electric & Manufacturing Company and the Westinghouse Machine Company, both of Pittsburgh, and Westinghouse, Church, Kerr & Co., of New York, has so increased as to make necessary the purchase of additional land and the erection of further workshops, which will nearly double the present output capacity in order to meet existing demands. The increased capacity, it is hoped, will provide, in a small measure, for the requirements of some of the principal steam railroads. Already railroads are planning to extensively use electricity for the operation of suburban traffic, especially in and near New York. . . . The manufacturing and engineering operations involved in these new developments are so stupendous and of so novel a character that it has become very difficult for a single engineer, however able, to adequately meet the situation. Recognizing this important fact, the Pennsylvania Railroad (one of the greatest business organizations in America), after the formation of a special board of officers and engineers to consider the subject in its several phases, has entrusted all that relates to the mechanical equipment of its power and passenger stations, and to the electrification of its tunnel system from New Jersey under the City of New York to Long Island and for the Long Island Railroad, to Westinghouse, Church, Kerr & Co., as engineers and contractors. . . . The bearing on your enterprise of this evidence of confidence is important, because your company is entitled to the benefit of the additional experience which will, as a result, be acquired by your American partners. This experience will be exemplified by drawings, plans and specifications, and the services of special engineers will be at all times available to your managers, and hence to the users of your apparatus.

The developments of these several American companies in the matter of new designs of apparatus, new methods of operation and of manufacture, have been particularly important during the past year, and especially in respect of the construction and use of gas engines and Parsons steam turbine engines. The right to the manufacture and use of the latter in the territory covered by your operations has recently been acquired. It has been demonstrated in hundreds of cases in all parts of the world that it is practicable and profitable both to supplier and user to supplant the ordinary wasteful steam engine with the electric motor operated by current from a central station, and being of fundamental importance in the establishment of power plants, the generation of electric energy at the lowest cost, both in capital expenditure and cost of operation, it is receiving the utmost attention of your managers. In the present practice of generating power, more than one-half of the fuel used is wasted, as compared with possible results. This waste of fuel and the amount and value thereof are so appalling as to justify large expenditures of capital to effect the saving of a commodity of vital importance, the supply of which is being rapidly exhausted. . . .

From the report of the board, which you have already had time to consider, you will observe that it is proposed to submit a resolution to increase the preference share capital to a total of £2,000,000—i.e., to authorize a further issue of 200,000 £5 preference shares to rank with those already issued, and if so authorized, your directors will forthwith offer 100,000 of such new shares to the present proprietors at £5 10s. per share. This additional working capital, which your extensive plans have contemplated from the first, is fortunately needed sooner than some of us expected. I say "fortunately," because we have already secured such a volume of business as to justify the profitable use of the additional working capital which will be required to carry the materials and accounts involved in the execution of existing contracts. In illustration of the capital requirements of such an enterprise as yours, I may mention a few figures relating to the American companies, whose business it is proposed you shall duplicate at your plant in Manchester, so far as the demand within your territory will justify. Their combined capital amounts to about £8,000,000. Their output for the present fiscal year ending March 31 next will exceed £6,000,000. Their orders and contracts in hand are very large and the monthly receipts of new orders for a long period have equaled the output of the factories of all those companies, notwithstanding a constant increase in the facilities of each concern. With prompt collections, the running accounts outstanding and the value of the material in process and required in stock aggregate nearly £4,000,000; and it may be further observed that the percentage of profit on the large amount of capital referred to (notwithstanding the keenest competition) is larger than when the volume of business was smaller, due to the fact that the later investments of capital have been, and should always be, much more remunerative than the capital first expended in the creation of the works and their equipment; and I may further add that both the preference and ordinary shares of the Westinghouse Electric & Manufacturing Company have for some months commanded a premium of over 100 per cent., the dividends on both being at the rate of 7 per cent. per annum.

Shortly before sailing from New York, I received a draft of the report of the board, which has since been issued to the shareholders, and submitted it to the directors of the Westinghouse Electric & Manufacturing Company. Their view of the report and the future prospects of the business is best illustrated by the adoption of a resolution authorizing me, at my discretion, to take all of the 100,000 shares proposed to be issued which may not be applied for by the proprietors at £5 10s. per share, which authority I may say I shall take pleasure in exercising, for such action will assure to your company a premium of £50,000 on the issue of the 100,000 new preference shares.

Neither your directors nor managers have any expectation that your company will enjoy a monopoly in the manufacture of electrical apparatus or of steam and gas engines, because, in view of the economy which can be effected by substituting the electric motor for the steam engine, the amount of apparatus which will be required for so large a territory as that within which your company will operate is greatly in excess of what can be produced under any one management. . . .

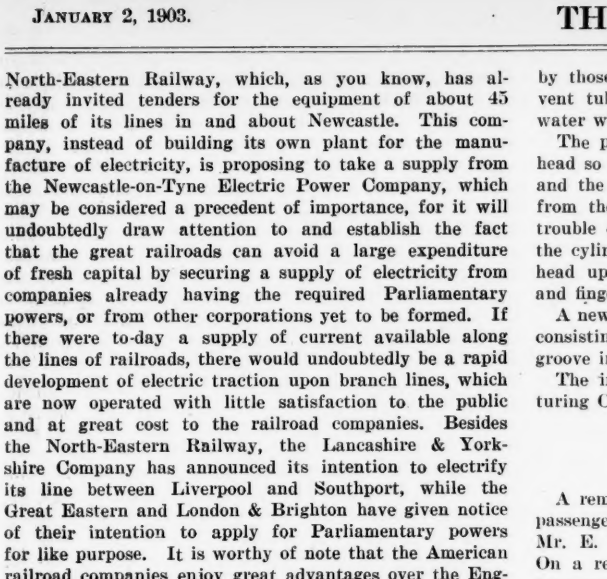
In my remarks to you last year, I predicted that the next 10 years will witness great developments. I meant great development of particular interest to the business in which we are engaged, and I then said, "If railroads want to protect the properties they have built up, they have got to take the initiative, and handle their suburban traffic by electricity, instead of sitting still and seeing competing companies started to cut into them." I had previously given public expression to a belief, founded upon a careful consideration of their requirements, that the great railroads of England could more advantageously purchase their supply of electric current from central power houses than by establishing the required number of smaller generating stations along their lines for their own use only. It seems to me, it is quite clear that the rate of development of electric traction in Great Britain will depend largely upon the facility with which the required capital can be raised, the machinery constructed, and the plants established. In the case of general power plants advantageously located, each to supply a number of users, the total apparatus, material and capital required for their construction would probably not exceed one-half the amount of that needed, if each of the railroad companies should proceed to establish the numerous small plants which would be required for the operation of their local train service in a very extended area. Since our last meeting, several of the leading companies have taken action in the direction indicated, among them the

North-Eastern Railway, which, as you know, has already invited tenders for the equipment of about 45 miles of its lines in and about Newcastle. This company, instead of building its own plant for the manufacture of electricity, is proposing to take a supply from the Newcastle-on-Tyne Electric Power Company, which may be considered a precedent of importance, for it will undoubtedly draw attention to and establish the fact that the great railroads can avoid a large expenditure of fresh capital by securing a supply of electricity from companies already having the required Parliamentary powers, or from other corporations yet to be formed. If there were to-day a supply of current available along the lines of railroads, there would undoubtedly be a rapid development of electric traction upon branch lines, which are now operated with little satisfaction to the public and at great cost to the railroad companies. Besides the North-Eastern Railway, the Lancashire & Yorkshire Company has announced its intention to electrify its line between Liverpool and Southport, while the Great Eastern and London & Brighton have given notice of their intention to apply for Parliamentary powers for like purpose. It is worthy of note that the American railroad companies enjoy great advantages over the English companies in the matter of the electrification of their railroads, for such work is almost wholly done under existing general laws, while the like simple right is not available to the English railroads.

From your report, it will be seen that there has been a most satisfactory growth of business, as indicated by the orders taken during the past fiscal year, aggregating £932,000, and those received since the beginning of this year amounting to over £825,000. Skill has been shown by your manager, Mr. W. H. Wells, in the negotiations which have led to the securing of this business, and in equal manner Mr. H. S. Loud, your works' manager, has effectively advanced manufacturing operations, while Mr. Jas. C. Stewart, who erected your works at Manchester, and who has since become one of the managers of your company, being especially charged with the execution of contracts, has pushed forward the work of the electrification of the Mersey Railway in a manner which has met with favorable comment from the parties in interest and the public. . . .

The Star Improved Steam Engine Indicator.

Viewed from the outside the Star improved steam engine indicator is designed somewhat on the lines of the celebrated Thompson indicator, inasmuch as the pencil movement is of the Thompson pattern improved. The interior design of the indicator is shown herewith in the sectional cut. The lower end of the spring terminates in a simple ball or bead, which has been successfully used in other instruments.



Star Improved Indicator.

This arrangement furnishes a ball and socket connection between the spring and the piston, which is necessary in all indicators of the Richard's type. The form of drum-spring used is the helical coil. It possesses the desirable features of simplicity and accessibility, and it can be readily adjusted for differences of tension.

One of the improvements in the instrument is the attachment of the cap at the top of the cylinder to the interior shell within which the piston moves, rather than to the outer shell, thus securing a correct alignment for the motion of the piston and its rod. At the same time the interior shell is movable, as in instruments which do not possess this feature. The method of construction is clearly shown in the cut. This arrangement also provides a jacket space filled with working steam completely surrounding the interior shell for the purpose of preventing an unequal expansion.

A noticeable feature is the means for unscrewing and removing the cap from the cylinder with the parts attached to it. The cap has a milled edge of the usual construction, but, unlike instruments of previous makes, the edge is protected by a hard rubber non-conducting covering. This covering can be handled with absolute comfort without risk of burning the thumb and finger with the hot metal. Another thing which will be appreciated by those handling the instrument, is the provision of a vent tube for carrying away the waste steam and hot water which blows by the piston.

The piston rod is provided with an adjustable swivelhead so that the position of the pencil arm can be varied and the atmospheric line drawn at any desired distance from the lower edge of the card, without going to the trouble of removing the piston and its mechanism from the cylinder. It is simply necessary to screw the swivelhead up or down the desired amount, using the thumb and finger.

A new form of detent motion is used in this instrument consisting of a ball which is thrown into contact with a groove in the circumference of the drum-base.

The instrument is made by the Star Brass Manufacturing Company, Boston, Mass.

A Fine Run on the Michigan Central.

A remarkable performance by one of the Atlantic-type passenger engines on the Michigan Central is reported by Mr. E. D. Bronner, Superintendent of Motive Power. On a recent date 16 passenger coaches weighing 605.57 tons were hauled from Bridgeburg to St. Thomas, a distance of 118.22 miles, in 127 minutes, which is at the rate of 55.8 miles an hour. The time includes eight slow downs. The grades between these two points are not heavy as will be seen by the following table:

Distance. Miles.	Grade in ft. per mile.
1	10 up
1	17 down
8	0
2	10 up
29	0
4	14 up
3	17 down
10	12 up
8	0
11	7 up
5	7 down
9	4 up
17	0
9	6 down

The total weight of the engine and tender with half a tank of fuel and water was 125.62 tons, and the weight of the cars, loaded, was 605.58 tons, making a total load of 731.20 tons.

The engine was built by the Schenectady Works of the American Locomotive Company, and is similar to the Central-Atlantic Class I locomotive of the New York Central which was desscribed and illustrated in the *Railroad Gazette* Feb. 1, 1901. The principal dimensions are:

Total weight of engine, lbs	176,000
Weight on drivers, lbs	90,000
Cylinders, in.	21 x 26
Drivers, in.	79
Heating surface, sq. ft	3,505

We gave in our issue of Nov. 22, 1901, the record of another fast run on the Michigan Central by an engine of the same class. Then the total distance, 229 miles from Bridgeburg to Windsor, was covered in 220 minutes, or at the rate of 62.45 miles an hour. There were, however, but five coaches in the train, which weighed about 215 tons.

Again in our issue of Nov. 1, 1901, we gave indicator cards and records from a Central-Atlantic type engine of the New York Central running between New York and Albany. In one case 13 loaded coaches weighing 685 tons were hauled the 143 miles in 167 minutes, or at the rate of 45.8 miles an hour. The speed during that run reached a maximum of 65 miles an hour and the corresponding horse-power was 1,452. This last run on the Michigan Central is, however, the best performance of this class of engines that has yet come to our notice.

The maximum power of a locomotive at high speed is limited by the ability of the boiler to furnish steam to the cylinders. Tests have shown that one square foot of heating surface cannot be relied on to evaporate more than 15 lbs. of water per hour. In the following deductions we have attempted to determine approximately the rate of evaporation during this run. The first step is to estimate the horse-power developed, which is a function of the drawbar stress and speed. The next step is to determine the total water required to develop that horsepower, and lastly the rate of evaporation.

The Baldwin Locomotive Works formula for train resistance is $R = 3 + \frac{V}{6}$ in which R is the resistance in pounds per ton and V is the speed in miles per hour. Neglecting the effect of grades, which in this particular case would slightly increase the resistance, the resistance at 55.8 miles an hour is $R = 3 + \frac{55.8}{6} = 12.3$ lbs. per ton. This value multiplied by 605.58 gives 7,449 lbs. as the drawbar pull behind the tender. A pull of 7,449 lbs. at a speed of 55.8 miles an hour is equivalent to a horse-power of 1,108. If the resistance of the engine and tender is included the horse-power becomes 1,337.

Tests show that a simple cylinder locomotive requires about 27 lbs. of water to develop one horse-power for one hour. On this basis the total evaporation per hour would be 1,337 × 27 = 36,099 lbs., which divided by 3,505, the total heating surface, gives 10.3 lbs. per sq. ft. of heating surface per hour. The resistance computed by the use of the Baldwin formula is much less than that obtained from the formulas of most other authorities. If Wellington's formula had been taken, the train resistance per ton at 55.8 miles an hour would be 16 lbs., and carrying the calculations through on that basis would give an evaporation of 13.4 lbs. per sq. ft. of heating surface per hour, a value close to the maximum capacity of the boiler.

All of the above deductions are, of course, only approximate, but they are useful in showing the part played by ample heating surface in heavy high speed service.

The make-up of the train and the log of the run follow:

Cars in Train.

Road.	Car No.	Weight of car.
New York Central	2,530	81,200 lbs.
" "	2,338	88,000 "
" "	2,343	88,100 "
" "	2,693	47,200 "
" "	2,681	41,800 "
" "	2,715	51,100 "
" "	2,336	87,200 "
" "	2,339	87,000 "
Boston & Maine	2,629	51,250 "
Merchants' Dispatch Transport.	15,011	49,000 "
Michigan Central	781	45,000 "
" "	763	46,700 "
" "	305	80,200 "
" "	257	49,900 "
" "	29	65,500 "
Pullman Attica	...	112,000 "
		1,081,150 lbs.
Contents		130,000 "
Total		1,211,150 lbs.

Log of Run.

Station.	Time.	Mins.	Miles.	Miles per hr.	
Bridgeburg	A8:13 a. m. D8:19 a. m.				
Victoria	8:21	2	0.81	24.30	*
Niagara Jct.	8:24	3	1.27	25.40	*
Stevensville	8:30	6	5.06	50.60	
Brookfield	8:35	5	5.44	65.28	
Welland	8:40	5	4.71	56.52	†
Perry	8:50	10	9.34	56.04	†
Attercliff	8:59	9	8.22	54.80	
Canfield	9:07	8	7.33	54.98	†
Edward	9:12	5	4.82	57.84	
Hagersville	9:24	12	11.57	57.85	†
Townsend	9:30	6	5.57	55.70	
Villa Nova	9:32	2	2.25	67.50	
Waterford	9:37	5	4.93	59.16	†
Windham	9:44	7	6.57	56.31	
Pt. Dover Jct.	9:48	4	4.13	61.59	†
Hawtrey	9:49½	1½	1.23	49.20	
Cornell	9:54½	5	5.08	60.96	
Tilsonburg	10:00	5½	5.44	59.35	
Brownsville	10:06	6	5.79	57.90	
Springfield	10:11½	5½	5.47	59.67	‡
Aylmer	10:14	2½	2.46	59.04	
Kingsmill	10:17	3	2.74	54.80	
Yarmouth Cross'g.	...	...	...	...	‡
St. Thomas	A10:26	9	7.99	53.27	*
		127	118.22		

*Yard limits. †Slow down for R. R. crossing. ‡Slow down for double track switch.

Efficient Discipline.

This was the subject for discussion at the meeting of the New York Railroad Club, held on November 21 last; and papers by Messrs. Ketcham, Wheatley and Slingerland were reported in the *Railroad Gazette* of November 28. The discussion at the meeting was short, and was participated in by only a few speakers, but communications on the subject were sent in writing by Messrs. H. Wade Hibbard, C. W. Bradley, E. Van Etten, A. W. Johnston and others. From these we extract as follows:

Prof. Hibbard: In the training of subordinate officers in shops always have some one in mind who would fill each man's place if necessary. Gang leaders and especially foremen, should be selected with the utmost care. Outsiders (new blood and methods) are occasionally preferable to promotions; but as a rule they should not be brought in unless absolutely necessary. Watch out for and promote good men. Keep your eye on the man who does far more and better than he is paid for or is expected to do. The natural leader may show his qualities in his development, in his desire to do his work in newer, better ways, keeping ahead of the others and showing them the way. A good foreman must not only be able to systematize work, laying it out and so keeping his men busy, but also be able to "manage" men. Find from subordinate officers whom they consider their best men, and watch them. But favoritism, jealousy, or personal dislike may bias subordinate officers. If it be decided, finally, to promote a man contrary to his foreman's judgment, put him in a different department until he has proved his worth. Always stand by those selections which have been justified by observation and experience. Uphold authority of all your subordinate officers when in the right. Train them not to make important decisions which will become precedents, without first consulting you. Never, under any circumstances, reprove them in presence of their men; there may be some criticism or request for explanation regarding work on the spot, though not to be heard by the men; but reserve all severe criticism for the private office. Never disparage one foreman when talking to another.

Have outlined a proper channel for complaints; complaints against a gang leader to be made to a foreman as a rule, not to the master mechanic—but let it be thoroughly understood that there is always the right of appeal to a higher officer. Be willing to revise a subordinate officer's overzealous, hasty or wrong decision, but with great tact and caution. A good plan, at least in small disputes where a workman feels himself unjustly treated, is to get the foreman and man together and then with careful study of the question you can show one or both where they have been too hasty; there should result voluntarily an acknowledgment of the mistake. If men's complaints are upheld by the master mechanic, foremen should understand that they should have removed the causes before the men reached the complaint stage. A subordinate officer will be more likely to refrain from unjust acts if he knows that the man will get a fair

hearing on appeal to the master mechanic. Subordinate officers should be given to understand distinctly that no man shall be persecuted for having appealed.

Keep in close touch with all subordinate officers. They should all understand your desires thoroughly and be absolutely loyal in carrying out the spirit of your laws. Assemble regularly the foremen of all departments, with the storekeeper and general foreman, into the office of the master mechanic, with a stenographer. Occasionally take probable future foremen into the meetings, which not only gives them some training, but results in the leading workmen having more insight into the problems of official management. After the general and detailed statements of conditions of work, stock, delays, etc., have been discussed, take up the subject of complaints, dissatisfaction and discipline of the men. In order to save time, it is well to have your secretary notify each one as to the disciplinary topics to be considered so that all may come prepared. Avoid any personal naming of a weak disciplinarian in meeting. Talk to such an officer alone.

Hold subordinate officers responsible for what their men do. Hold foremen responsible for what their own subordinate officers do. Under most circumstances, if an officer is held responsible for "results" of his subordinates he should be given subordinates satisfactory to himself. Under-officers should be encouraged to ask advice from superior officers without such asking giving the impression that they lack decision or have a desire to shirk responsibility for their later action. It will need some tact for the superior officer to prevent his advice from being considered mandatory.

Foremen never should be late; the master mechanic should be on hand early, occasionally, at the spot where a foreman should be. Officers should transact shop business with the proper subordinate officers, not with the men under them. All officers must sustain cordial shop relations with each other. It is the duty of a superior to correct the first sign of discord among inferior officers. Unfailing courtesy at all times by officers towards men is demanded; this does not prevent severe language when possibly needed. A foreman should analyze the discipline failures and successes of himself and other officers. Avoid that undue "familiarity" with the men outside which "breeds contempt" and lessens their respect, though having a sufficiently rugged personality to permit judicious mingling with them without harm, getting their good-will and keeping on good terms with them and being yourself approachable. It is easy to invite or repel familiarity by one's manner. In the shop avoid any familiarity with any "pets."

Get out of an officer's head the idea that he is any better than his men. Possibly only the accident of opportunity has placed him above them in control; a number of them might do better than he if in his position. All officers should be neat and clean in person. Often it is necessary for them to get dirty, but they should not stay dirty. A small monthly prize, and, of course, verbal commendation, will stimulate foremen to try to have the cleanest department without increased labor cost.

New foremen should not be too quick to institute needed changes by wholesale and prompt overturning of customs. First let him get quietly and thoroughly acquainted with all sides of the situation and the men. If the methods of work need to be speeded up all around, let him do it gradually, possibly with only one workman at a time, thus avoiding united opposition. Keep close watch of the shop, inspect daily and oftener. Know in a general way about how much work each man, gang and department ought to do, with close enough knowledge to be able to keep the foremen up to limits; the details must, of course, lie with them.

An officer should have the ability to unload work and responsibility upon his subordinates instead of trying himself to do things in detail and routine work, training his subordinates to be increasingly efficient, and thus to set free more of his time for attention to further and new matters pressing for solution. Proper arrangement of work to each subordinate will enable that subordinate to get his work thoroughly in hand and to present such reports to his superior as to enable the latter to understand difficulties at once and solve them without waste of time. An officer is judged by the assistants he gathers around him. Later on, these "understudies" will be ready to take up his work if he is laid aside.

Have a manly, unpatronizing, unpaternal, yet sympathetic application of the Golden Rule. "Do unto others as you would have them do unto you."

Mr. C. W. Bradley: As an academic proposition I heartily endorse in general what the gentlemen have said; but, to be frank, I must take exception to my friend Ketcham's idea that a man once discharged should never be re-employed. I am not a believer in the theory that "the King can do no wrong," nor in the divine right of the railroad official to brand a man for life for an error he may have committed, or a mistake he may have or may not have made. My Bible teaches me that forgiveness is one of the tender, loving attributes of Divine Providence, and the true spirit of Christianity. I do not believe in the infallibility of any railroad official.

Mr. Bradley here quoted from the regulations of the United States Army, in which persons in authority are required to exercise firmness, kindness and justice, and are forbidden to injure those under their authority by tyrannical or capricious conduct; and all military men are to respect superiors, not only on duty, but on all occasions. Medals of honor are awarded for distinguished service, and extra pay is allowed to a soldier who receives a certificate of merit.

How is it in the railroad service? Is there that comradeship and courtesy between the railroad officials and their subordinates, as a rule, that there is in the army? Courtesy begts courtesy. Discipline grows with what it is fed on. Fair dealing begets good, loyal service, and the test of efficiency is results.

General Sherman in his memoirs says: "No man can properly command an army from the rear. He must be at its front, and when a detachment is made, the commander thereof should be informed of the object to be accomplished and left as free as possible to execute it in his own way; when an army is divided up into several parts, the superior should always attend that one which he regards as most important. Some men think that modern armies may be so regulated that a general can sit in an office and play on his several columns as on the keys of a piano. This is a fearful mistake. The directing mind must be at the very head of the army, must be seen there, and the effect of his mind and personal energy must be felt by every officer and man present with it to secure the best results."

The railroad officer who sits in his office and plays on his men as on the "Harp of a Thousand Strings," with long, windy, typewritten, nagging letters and telegrams to his subordinates, does not encourage good service or produce the best results. He may have efficient discipline, but he will not secure the loyal, earnest support of his men. At the present time when every yard east of the Rocky Mountains is congested, how many of you—you operating officers—have spent a whole day or two whole nights on the ground to know, actually know, for yourselves just the condition, and by your presence in the field assisted in raising the blockades? Don't some of you play golf days and work the telephone nights? Would not a little of the discipline you are giving your men, applied to yourselves, help the situation?

The officer, no matter what his position, who is not a manly man and who does not treat his men like men, will not get good service, discipline as much as he may, by fine, suspension or discharge. They will hate him. They can't help it, and will "best him" when they can. The average railroad man knows about as much about the service as the average railroad officer does.

To produce the best results, begin your efficient discipline, like charity, at home. Discipline yourselves and give your men the same loyal, earnest support you expect from them. Go to the front yourselves. West Point does not make the successful commander unless the man has the stuff in him to command, and this faculty of command over men comes from a higher Power than the cadet gets during his four years' tuition on the banks of the Hudson.

There is another phase of this question, and that is, the uncertainty of the tenure of office. How many of you who are present here this evening know, know absolutely, that you will not find a blue envelope on your desk in the morning. How many of you have been there? And how often have you seen a change in the executive head of a road or a system followed almost immediately by a change of every subordinate official in every department? No reasons stated, nor any explanations given. Do the men who are thus "bounced" get off the earth? Do they sink out of sight? Are they lost to the railroad world? Not much! In many cases they are re-employed elsewhere with increased responsibility. Some of the older men, however, I regret to say, are turned out like an old army mule—to eke out his last days as best he can. I am glad to say, however, that there is not as much of this wholesale slaughtering to-day as has been the practice in the past.

Mr. Bradley, in closing, recommended the general establishment of pensions, which he declared would at once raise the morale of the railroad service.

Mr. E. Van Etten: Since creation, saints as well as sinners have acknowledged that fear was the means to the most efficient discipline. All through the Old and New Testaments, and down to the "Standard Rules," the fear of punishment as a means of discipline is the rule rather than the exception.

When, after years of labor as a subordinate, I became a "boss," or rather was placed in charge of men, I had an idea that the average individual was a pretty decent sort of a fellow, and, if treated like a man, there would be no necessity to watch him; that he would treat me as a man should, would try to earn his wages and most certainly look out for his employer's interests. That is the method I began with. But we live and learn. Our idols in life are shattered one by one. Experience is a dear but a first-class teacher. Thirty years in handling men have taught me that my idea was utopian, and that the average man is *not* trying to earn his wages, but *is* trying to see how little he can do for the largest pay. He is shirking and working only for the quitting hour. Neither has he the interests of his employer at heart, but rather the selfish individual feeling that makes him drop his employer's interests when his back is turned.

The exceptions—men who are trying to do what they know to be right—are the ones who are promoted. Good men, who are treating their employers as they would like to be treated if the positions were reversed, are sought for in every department in all walks of life. The demand for the right kind of men everywhere far exceeds the supply. This, you may say, has nothing to do with discipline. Possibly not, but it emphasizes the fact that if you expect anything from the mass of your employees, you must have the old-fashioned kind of discipline, fear. You cannot depend upon a man's moral sense of what is right or wrong in his treatment of his employer.

It is a well-known fact that a man who would scorn to cheat his neighbor out of a single penny, who could be trusted to do the square thing in any ordinary business transaction, would not hesitate to beat the railroad out of fare whenever he could; it may be that the moral sense of the railroad employee is deficient in the same way and that the desire to shirk, the lack of interest in his employment, applies only to this class of employees. My experience has been limited to men employed by railroad companies, but at the same time I have no reason to suspect that they are any different than men in other employment.

Nothing, in my opinion, is so likely to make trouble as the fact that there are a few employees known to have a "pull." The employer must be fair and just in his discipline, and to that end must have certain fixed rules making the "punishment fit the crime," which must in no case be varied from. Smith and Jones are enginemen. Both are unfortunate enough to collide with a train of another road at a grade crossing, under circumstances exactly alike. The rule may be that an offense of this kind calls for the dismissal of the employee, but Smith has never had an accident before, while Jones has been in several. If Jones is discharged and Smith is suspended only, Jones will never believe but that he was treated unjustly, and his friends will feel the same way. My theory is that both men should be discharged and then, if later the employer believes that Smith's record previous to the occurrence really entitled him to different treatment than that accorded to Jones, let him frankly tell each man so and re-employ Smith if he desires, but not Jones. In this way only, I believe, will the employer retain the confidence of his employees.

Any system that means bookkeeping, with addition and subtraction before an employee can be advised just what discipline is to be meted out to him, will always cause the employee to look with suspicion upon the bookkeeper—the employer. Envelopes representing each employee, into which are placed slips stating concisely all the doings, good, bad or indifferent, of the employee represented, are, to my mind, the best record possible; but whatever method obtains as a help to efficient discipline, the employer must always be fair and able to give a sensible reason for his action if he would have his employees retain complete confidence in his judgment and his decisions, without which efficient discipline cannot be maintained.

Mr. A. W. Johnston: One of the weak points in many railroad organizations in the spreading out of the territory and expanding of the duties of subordinate officials; there is practically no study of the personal equation, and consequently no rational scheme for administering any phase of discipline. The Superintendent or the Train Master should be in a position to know his men as well off duty as on duty, and his other responsibilities should be so regulated as to permit this to be accomplished. The so-called "Brown System" of discipline referred to by Messrs. Ketcham and Wheatly has apparently been differently interpreted by each. I presume no railroad officer in recent practice will uphold the former method of indiscriminate dismissals and suspensions, and yet in some forms of the Brown system there has been an equally indiscriminate method of "Suspensions by Record." I know of instances where it was an act of greatest kindness to the offender to compel him to lay idle. Study of the personal equation of such a case impels the suspension. Mr. Wheatly says that the general should touch elbows with the "rank and file" as often as he can; but if the general does not have able lieutenants, the general would probably on his occasional visits find perfunctory respect and little enthusiasm.

Mr. George W. West spoke briefly at the meeting. He said that there are three classes of men in the railroad service that produce bad results; first, those who are wholly unfitted for the work, yet who do get in; second, the class of men who are always "playing in hard luck"; the third class consists of those who know how but will not. This last class needs to be ruled with a rod; but unfortunately the rod is falling into disuse.

A Russian Railroad Strike.

Russia has had a great railroad strike. About 3,000 men employed in the shops at Rostof demanded at once higher wages, shorter hours, and the discharge of several obnoxious foremen. The railroad authorities referred the demands to the Minister of Transportation. The Minister telegraphed not to grant the demands; and the men were then notified that they would be paid off and discharged if they did not return to work by Nov. 24. On that day crowds of workmen gathered and when the police and soldiers tried to disperse they were stoned and 10 or 12 were badly hurt. The soldiers then fired upon the crowd and four were killed and 17 wounded.

A little later there was rising of workmen at another station, where men from Rostof are said to have been the leaders; about a thousand men gathered and stoned the Cossacks, wounding 12, while an officer had his hand cut in two by an axe. The crowd was then fired upon and 21 were killed and wounded, and more than a hundred made prisoners.

The Russian journals report that these were demonstrations of a socialistic organization, and revolutionary

in their character. Russia has but fairly entered upon its industrial career, and until recently has had few large gatherings of workmen. As its success in this career must depend very largely on the character of its workmen, their temper and disposition will be watched closely in other industrial countries which compete with Russia. There is some reason for suspecting that, like some other Slav people, the Russians, when excited, lose their self-control and act with little regard for the consequences.

Mr. Depew on Senator Sewell.

On December 17, memorial addresses on the late Senator Sewell were delivered in the United States Senate, and they make a very interesting chapter in the *Congressional Record*. The following passages are from Mr. Depew's address on that occasion:

He began as a poor boy without a penny and accumulated a fortune. He began in public life simply as a worker in the ranks of his party and reached the highest position that his country can give to one born upon a foreign soil. Starting as a soldier in the humblest position as an officer, by gallantry he retired a Brigadier-General, and was then brevetted a Major-General for gallantry in the field. Commencing in the humblest capacity in the railroad in which he worked for nearly 40 years, he became the president of all its lines in the State in which he resided.

He began his career in the corporation, in which the individual is eliminated, and all private views, private character, private ambitions, and private ability are reduced to the general mass, says the theorist. And yet it was in that career, which occupied the whole of his active life, in the service of one of the greatest corporations in this country that he achieved in finance a success, in public life a success, in his profession a success, as a soldier a success, in any one of which any man would have been said by his neighbors and his family to have accomplished an honorable and distinguished career.

I think that his success was due to the directness and the courage which he had. The courage which he displayed upon the battlefield was the courage which was displayed by millions of his fellow-citizens who served under the one flag or the other during the Civil War. But he had a higher courage than that mere physical courage, which is admirable, but with which our race is gifted. He had a moral courage, and to that he owed the major part of his success.

During the period when he was most active in politics, when he was most ambitious for popular favor, there prevailed through this country that singular craze and prejudice which said that the million of men engaged in the profession of railroading were unworthy of public confidence, and were dangerous to nominate for public office. There were times when this rose so high that, while both parties wished the services of the railroad man after the nominations were made, neither party dared nominate a man upon the pay roll of a railroad company for a village, a county, a State, or a national office.

Many who had ambitions at that period sought to gratify their ambitions by denying the profession in which they were engaged or minimizing it; but Senator Sewell always remembered that he was one of a million men engaged in a profession which required as much, at least, if not more, of ability, of intelligence, of sobriety, of industry, of fidelity, and all the qualities that go to make up good service and good citizenship, than any other pursuit in the country.

It was the peculiarity of this craze, of this prejudice, that it applied only to those who were on the pay roll and receiving their stipend—salary, wages, whatever it might be—in the regular way from the treasury of the corporation. During the whole of that period the president or the general counsel could retain distinguished lawyers who would receive as compensation many times what the officer or the general counsel had in the way of salary, who would appear in the State and in the national courts, and sometimes when the Government and the corporation were in antagonism, and yet that politician becoming a statesman, or one at the time, could appear in this capacity, and then upon the platform or in Congress denounce the corporation and retain the confidence of his fellow-citizens.

Mr. Sewell when he ran for the State Senate first, and again and again, he was the leading railroad officer and the representative of all the railroads in his State, and he made no concealment of the fact. On the contrary, while he did not run as such, he did run asserting, "I am as worthy, if as a man and a citizen you think me so, as you, gentlemen, who are engaged in any other pursuit, avocation, or profession." And that courage elected him. It re-elected him. It re-elected him. It made him the leader of his party in his State. It did more. It made his State, which has always been freer from prejudice than most of the Commonwealths, choose him the leader of the delegation in six national conventions, where he was to be a great force in saying who should receive the nomination for the Presidency and Vice-Presidency, when upon that nomination and upon that platform depended the fortunes of the party to which he belonged.

When in public life he illustrated that he could be a railroad man in his profession and a public man when intrusted by the people with office. To his initiative, to his skill as a business man, and to his lack of prejudice on all questions is due that legislation in the State of New Jersey by which taxation has been lifted, so far as State taxation is concerned, from the farm, from industries, and from labor, and placed upon the corporations. He perfected that system so that from the corporation and not from the farm, not from industries, not from labor, comes in the State Treasury of New Jersey to-day revenues which have relieved it of State debt, revenues which pay the whole of its State taxation, revenues which take care of its educational system, and revenues which seem as though they would ultimately wipe out local taxation.

Senator Sewell was in no sense a spectacular man. We who knew him best knew that he avoided crowds, he avoided applause, he never played to the gallery. He was always intent upon the one thing which he sought to accomplish. The motive power of his career was its directness, its courage, its outspokenness. When he started in the railroad business he meant to be president of the railroad, and he was; in finance he meant to get a fortune, and he secured it; in politics he meant to go as far as he could under the laws and the Constitution of the United States, and he did.

Improvements and Inertia.

A year ago a committee of shareholders of the London & North-Western Railway was formed to consider and report upon the possibility of changes in methods that might lead to greater net earnings. This committee consisted of Lord Brassey, Mr. W. Burdett-Coutts, M. P., the Honorable George Peel, Mr. Nathaniel Spens, Sir John Gilmour and Mr. Richard Green. Oct. 10, the committee addressed to Lord Stalbridge, the Chairman of the company, a letter setting forth shortly the sum of its studies.

The first recommendation is that the London & North-Western should summon a special conference of railroad officers to examine and define the best means of securing a greater measure of co-operation.

It is believed that the end desired may be helped forward by the use of methods of handling traffic such as those used in America.

It is also believed that good would come from the adoption of methods of accounts somewhat like those used in America, which would enable the causes of loss and gain to be located with accuracy and would afford a valuable guide to the administration and management of the line.

Still another benefit is anticipated from this conference. Public opinion and opinion in Parliament and municipal bodies misconceives the position of the railroads and ignores the important service they render and the difficulties under which they work. Serious evils result, and it is believed that a conference could make a broad and authoritative statement of the rights and the disabilities of the railroad companies and of the serious and constantly increasing burdens imposed by public authority on a class of property which renders a great public service.

November 21, Lord Stalbridge answered this letter of October 10. He pointed out, concerning the first suggestion, that for many years directors and managers have been pressing the policy of co-operation and that they have made many arrangements with regard to competitive traffic and wasteful competition, which arrangements are in force, but these arrangements can be arrived at only by careful and almost confidential negotiations and with due regard to divers' interests. It is not believed, therefore, that the summoning of a special conference would have any good result.

The management of the London & North-Western has long been well aware of the American method of handling freight traffic, particularly in cars of large capacity, but the general adoption of such cars would be utterly inapplicable to English traffic and no general conference is necessary to discuss this question. The cars running in mineral traffic are mostly owned by the private companies. Their size, therefore, is controlled by the traders themselves, and by physical conditions at the collieries and docks.

Concerning the American system of accounts, Lord Stalbridge and his officers and directors are of the opinion that no good result would be obtained by the showing of accounts other than those which are now published half yearly. Although the English companies do not prepare statistics applicable to the whole line on the elaborate basis of American accounts, yet all the information which is necessary or desirable is available and is used.

With regard to taxation and to legislation, a conference could hardly do more than is done now by the various chairmen of the companies at the regular half-yearly meeting. Assistance in this direction should be given by the shareholders themselves, who can usefully exert their influence in municipal affairs as well as in Parliament.

On December 10 the committee replied at length to the letter of Lord Stalbridge. Taking up first the matter of co-operation, the committee quoted words from his Lordship's speech at the last general meeting of the company, in which he pointed out that they had to fight to get more traffic and had to fight against being robbed of traffic, and that the North-Western seemed to be in a position to be robbed by anyone, right and left. Apparently the efforts at co-operation have not established very substantial results. This opinion is confirmed by recent speeches by Lord Allerton, the Chairman of the Great Northern, and by Sir Ernest Paget, the Chairman of the Midland, who recommend further co-operation.

As regards the careful and almost confidential negotiation that is necessary, the committee suggests that the proceedings of this conference shall be entirely confidential. Obviously, there exists a rivalry prejudicial to the interests of the railroad companies and to the interests of the public at large The committee quotes the Chairman of the North-Eastern Railway as urging further co-operation, and quotes from still other officers.

The committee takes entire exception to his lordship's statement that trade in Great Britain will not yield heavy wagon loads. The Lancashire & Yorkshire has recently built 30-ton wagons, and the success has been such that 50 more have been ordered. The North-Eastern has recently built 32-ton and even 40-ton cars for mineral traffic. "Accordingly, your objection to large wagons appears to us to be founded on conceptions which experience has begun to displace." The inference that the traders are opposed to larger wagons and that the company has no influence in the matter is next taken up. The committee understands that many large collieries, quarries and industrial works are willing to use larger wagons. The railroad company could do a great deal to make this possible, and especially by its influence with the Railway Clearing House, which has failed to revise its old standard specifications and to issue new ones for traders' wagons of greater capacity than 10 tons.

But his lordship confined his answer to the single point of the size of wagons, and did not mention the greater question of the train load. The committee believes that the train load could be increased with economy of capital and of revenue, saving money in many directions.

His Lordship's admission that the English statistics, although as complete as is necessary, are less detailed than those in use in America, is of serious importance. First, American authorities hold that these very statistics have helped to secure great results and to maintain high progress. Second, the American system of statistics is now being introduced into England by the boards of more than one progressive railroad. The committee is naturally anxious that its own company should not fall behind other companies in a matter so vital to the most efficient management. The London & North-Western accounts, whether published or unpublished, offer no information as to the general mileage, the passenger mileage, the train load, the wagon load, the engine load, the length of haul, the average receipts per passenger mile or the average receipts per ton mile. The committee then quotes Mr. Gibb as having said that railroad managers have been severely handicapped by the want of these statistics, a handicap borne so long on account, probably, of the heavy weight of custom in England.

The committee then points out the diminishing profit of the London & North-Western, and the consequent need of accurate and precise statistics, in order that every detail of working may be closely scrutinized. Until this is done, no effective remedies can be applied or economies introduced. "Upon the question of statistics, we will presume to add that not only should these statistics exist in your office for daily use but they should be published yearly with your accounts." Such a course would encourage competition in economy, instead of the present hurtful competition to snatch half a ton of traffic from a rival.

The committee announces its purpose to lay this correspondence, embodying the results of negotiations extending over a year or more, before the whole body of shareholders, and has actually done this through the medium of the public press.

We should not wonder if his Lordship found a pretty lively hornets' nest buzzing about his ears.

The Traffic On the Soo Canals.

A table printed below gives a summary of all of the traffic through the canals at Sault St. Marie in the seasons of 1902 and of 1901. The immense growth of the registered tons and tons of freight will be at once remarked, namely, 30 per cent. and 27 per cent., respectively. The iron ore traffic also increased 34 per cent. and the wheat 45 per cent. The heavy decrease in hard coal movement means a great deal to the people of the Northwest, but absolutely that is a very insignificant part of the lake traffic. The table is compiled by Mr. Joseph Ripley, the General Superintendent of the American Canal, under the direction of Major Bixby, Corps of Engineers, United States Army.

Lake Commerce Through the Canals at Sault Ste. Marie, Seasons of 1901 *and* 1902.

Items.	1901.	1902.	Inc. P.c.
Vessels—			
Steamers, number	14,372	17,069	19
Sailing, number	4,482	4,368	*3
Unregistered, number	1,187	1,222	*3
Passages, number	20,041	22,659	13
Lockages, number	11,321	12,846	13
Tonnage—			
Registered, net tons	24,626,976	31,955,582	30
Freight, net tons	28,403,065	35,961,146	27
Passengers, number	59,663	59,377	..
Coal—			
Hard, net tons	804,493	309,948	*61
Soft, net tons	3,788,643	4,502,530	19
Flour, barrels	7,634,350	8,910,240	17
Wheat, bushels	52,812,636	76,730,965	45
Grain (other than wheat), bush	24,760,547	27,740,822	12
Manufact'd & pig iron, net tons.	206,443	198,152	*4
Salt, barrels	443,774	443,306	..
Copper, net tons	98.601	120,612	22
Iron ore, net tons	18,090,618	24,277,555	34
Lumber, M. ft., B. M.	1,072,124	1,091,471	2
Silver ore, net tons	...	1	..
Building stone, net tons	46,584	38,919	*16
General merchandise, net tons.	558,041	740,100	33

*Decrease.

The United States Canal was opened April 5 and closed Dec. 16, 1902; season, 256 days. The Canadian Canal was opened April 1 and closed Dec. 20, 1902; season, 264 days.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Single Track Automatic Block-Signaling.

When are we going to run trains on single track without the delays due to sending, repeating and delivering telegraphic train orders? Besides the delays there is in the despatching system an element of danger, and when trains are irregular, and the best safeguards are needed, then the danger is greatest; for the more irregularity we have the more orders do we require.

Signal theorists have long assured the railroad world that with the aid of the electric current and well known forms of fixed roadside signals the maximum of safety can be obtained, combined with the minimum of delays, without using written orders or employing telegraph operators; but, somehow, this promise does not get carried out in practice. We have the manual or telegraph block system on single track lines, but its use does not seem to lead anybody to relax the train-despatching rules. The old English staff is safe, but American railroad officers do not like it. The electric staff is now in extensive use in England, Australia and elsewhere, and no one denies, so far as we know, that it does what it claims to do; yet its introduction proceeds very slowly. What is the reason for this?

Besides the staff—the old style and the new—we have electric automatic track-circuit block signals; but these are not used to any considerable extent on single track except by two companies. A report from one of these companies appears in another column of this paper, and it is a clause in that report—the statement that the signals are only an auxiliary, and that the time-table and the train despatcher's orders continue to be the main provision against collisions—that has called out the foregoing reflections. If the despatcher's work is done no faster on the Southern Pacific than on other first class lines—and we cannot see how it can be done any faster—it must follow that the large investment required to put in these automatic signals has not been of any benefit in the direction of doing away with the delays connected with the making of meeting points by despatcher's orders.

In view of the great savings that have been made on double track lines by increasing their capacity by the use of automatic signals, this seems on the face of it to be an unsatisfactory result. The automatic signals have added an element of safety, but the old time-consuming safety arrangements have to be s ill continued in force. On double track lines train B occupies a block section within half a minute after train A vacates it; and an inferior train can use a block until within a minute of the time that a superior train is ready to enter it. For opposing trains on single track this economy of time appears to be impossible (except when all trains are on time) without the aid of the cumbersome 31 order. Is there no convenient and economical way out of this?

Forty-nine Passengers Killed

Also two employees; and 40 passengers and four employees injured. This is the record of two collisions, one reported last week and the other this; one in California and one in Canada. The rear collision at Byron, California, on the evening of December 20, appears to have been on a long and level tangent. It occurred on a clear night and the tail lights of the standing train were visible for miles. The second of the two passenger trains, running southward, had been on the road only an hour or two, so that the engineer can hardly have had any legitimate cause for being sleepy, and yet, so far as we can gather from quite intelligent reports printed in the San Francisco papers, this engineman is the person directly to blame. One of these papers reproduces a photograph showing the colliding engine completely covered by a shell consisting of the roof and sides of the rear coach of the train which it ran into. The car lies almost exactly in a horizontal position, and though the ends and floor have been entirely knocked out, is not distorted. This picture indicates that the collision must have been at great speed. The engineer, 52 years old, is an experienced runner.

The butting collision at Wanstead, Ontario, was due to the non-delivery of a meeting order. It is not clear whether the station operator withheld an order which had not been annulled, or the despatcher made some mistake in annulling the order. The train-order signal holding the passenger train was cleared before the withdrawal of the order which had been sent to the opposing train. The station operator (agent) is a man of 30 years' experience and the despatcher is spoken of by an officer of the road as one of their best.

The causes of these collisions will, no doubt, be discussed at length before coroners' juries; and the lawyers, representing the well-informed public, will ask questions concerning the minutest details of the regulations and about the conduct of the men involved, during each minute of the period of time that covered the misconduct which led to the disasters. Newspaper readers, representing that part of the public which is less well informed, will read columns of these questions, with their answers; and all to what purpose? The same process has been repeated a hundred times, and the discussions now, in 1903, will produce just about the same result as did similar discussions fifty years ago. We confess that we have done a good deal of this apparently useless discussion ourselves.

The reason why the flagman did not go back at the right time; or why the engineer did not keep a good lookout; or why an operator failed to realize the importance of methodical procedure; or why a despatcher, entrusted with hundreds of lives, worked as nonchalantly as if playing chess; or why a superintendent took it for granted that men were disciplining themselves, instead of seeing to the discipline himself; these and similar questions have engaged our attention in the aggretate for many hours. They have been gravely discussed by State railroad commissioners and, what is the gravest feature of the business, have been discussed by railroad officers who ought to know better. That is to say, railroad officers go on dealing with this disease by means of the remedies prescribed by the doctors of the old school when the only hope is in changing the school. Flagmen and despatchers are inadequate, and the block system is the only hope.

If any one thinks this too radical a statement, we should like to know what he thinks of these blots on our boasted progress in the art of railroading. It cannot be that he ever witnessed the horrors of a great railroad accident. Are we to go on forever recording a great disaster every year or oftener? The depressing effect of the financial losses ought to have some influence, to say nothing of the physical and mental horrors of the victims.

It is indeed a great triumph to carry freight at a third of a cent per ton per mile, but everybody travels, and the privilege of easy and safe transit has become a necessity of civilization, and the perils of the ocean have been reduced with more certainty, if not in greater proportion, than the perils of the railroad.

From a business point of view, it is pertinent to ask how a railroad company can offer to its passengers safer transit on one part of its line than on another. It is reasonable enough to make a difference between first class lines and second class as regards elegance and speed and various conveniences; but in the matter of safety the public may properly ask for a high standard on all passenger lines. A certain railroad from New York to Chicago may be worked by the block system; a certain other railroad may be thus worked part of the way, or not at all. The first mentioned is without doubt the safer of the two, so far as this element goes. What is the warrant for this difference? Does a greater volume of business on the first named line afford all necessary justification? We are considering the matter now entirely apart from the question of whether the two lines are owned by a single company or by two different companies. The railroad profession is responsible for the railroad as a whole, and is disgraced, as a body, by any defect in railroad management. The fact that your line, or a given division of your line, is not the most important through line in the country, does not absolve you from responsibility when you kill your neighbors; especially if you bid for traffic which could just as well be carried by the supposed more important through line.

Great safety on passenger railroads everywhere will certainly be the demand of the intelligent public if ever it finds its voice. It is true that in a new country we must have cheap railroads, but our trouble seems to be that we want both cheapness and all the conveniences that go with costliness; and we are still blundering along in the hope that the impossible combination will work. If horrors like Byron and Wanstead will only come sufficiently far apart we shall probably continue this fatuous course. Perhaps it would be a blessing if they should come near enough together to produce a general awakening. Every responsible person knows, or may easily get the evidence that the block system is immeasurably safer than the old methods, which prevail throughout more than three-fourths of the railroad mileage of this country. It is susceptible of development to approximate perfection, which the flagging and despatching systems are not. Where passenger trains are not run under safeguards which conform to the highest reasonable standards, there is a serious duty to rigidly limit the speed of all trains to a low rate.

The Safety Appliance Law Before the Courts.

The United States Circuit Court of Appeals (Eighth Circuit) has issued a decision (Johnson vs. Southern Pacific*) on the safety appliance law, in which it is held that an empty car moving in a yard is not engaged in interstate traffic, a view which appears to be almost directly opposite to that taken by District Judge Shiras in the Iowa case, last June (Voelker vs. C., M. & St. P.: *Railroad Gazette*, Oct. 24, p. 819). We cannot assume that the two decisions are entirely inconsistent, for in each case the judge appears to have confined himself strictly to the particular circumstances of the case in hand, and the two are not exactly alike. In one case an empty freight car was being switched, and had to be coupled to other cars; in the other a dining car was being taken by itself to the turn-table The present case ap-

*United States Court of Appeals for the Eighth Judicial Circuit in Johnson against the Southern Pacific Company. The requirements of the safety appliance law were construed as follows:

The act of March 2, 1893 (27 Stat. c. 196, p. 531), does not make it unlawful for common carriers to use locomotives engaged in interstate commerce which are not equipped with automatic couplers.

A statute changing the common law modifies or abrogates it no farther than the clear import of its language necessarily requires.

A penal statute may not be so broadened by construction as to make it cover, and authorize the punishment of, otherwise lawful acts, which are not denounced by the usual meaning of its express terms.

A statute which enumerates the parties, things, or acts which it denounces thereby impliedly excludes all others from its effect.

When the language of a statute is unambiguous, and its meaning is plain, it must be held to mean, and the legislative body must be held to have intended, what it plainly expresses, and no room is left for construction.

A servant assumes the ordinary risks and dangers of the employment upon which he enters, so far as they are known to him, and so far as they would have been known to one of his experience, age and capacity by the use of ordinary care.

A brakeman of ordinary intelligence and experience assumes the risks and dangers of coupling cars provided with different kinds of well-known couplers, bumpers and deadwoods, because these are the ordinary risks and dangers of his service.

The equipment, under the act of March 2, 1893, of a car with automatic couplers which will couple automatically with those of the same kind or make, is a compliance with the statute. It does not require cars used in interstate commerce to be equipped with couplers which will couple automatically with cars equipped with automatic couplers of other makes.

Cars loaded with articles shipped to other States, and started, whether in yards, on side tracks, or in trains, are used in moving interstate traffic. But vacant cars in yards on side tracks, in repair shops, or in trains which are not loaded with, or in use to move articles of, interstate commerce, do not fall within the terms or meaning of the act of March 2, 1893. A dining car standing empty on a side track at an intermediate station, where it had been left by a train engaged in interstate traffic until it should be taken by another train engaged in the same traffic, going in the opposite direction, and which the owner intended to use in interstate traffic, was drawn by a freight engine from the side track to the turn-table, turned and placed again upon the side track. Held, that the car was not used in moving interstate traffic while it was on the side track and while it was being turned.

pears to have arisen from an accident (in Utah) which occurred to a brakeman in consequence of his trying to couple a Miller hook to a Master Car Builders' drawbar, the engine being equipped with one and the dining car with the other. In passing it is to be noted that the decision that this dining car movement was not interstate traffic is dissented from by one of the three judges; who says that the reasoning (ninth head note) is too fine-spun to be compatible with common sense.

Besides holding that the movement of the empty dining car on a side track was not interstate traffic the Court says (Head notes, 8th paragraph) that a coupler complies with law if it will couple automatically with its own kind. This has caused some discussion because it appears to say that the Boston & Maine, for example, complies with the law when it equips its passenger cars with the Miller automatic coupler, which coupler, of course, will not couple with cars of connecting roads—say the Boston & Albany—which are equipped with Gould (M. C. B.) couplers. From this it would seem to follow that the law does not compel the Boston & Maine to interchange cars with the Boston & Albany. But if the judge says this he only says what everybody already knew. Indeed, the law permits a road to have a part of its trains, on its own road, equipped with one style of automatic coupler and a part with another automatic coupler. But if the B. & M. does voluntarily interchange with the B. & A. it is bound to see that all cars which are run in the same train will couple with one another automatically. The statute would undoubtedly be interpreted by any court to require this. The decision does not deny it. Not only is the automatic feature required to be uniform throughout the whole of a train (back of the engine); it is required as regards cars being switched in yards, if they are loaded with interstate passengers or goods. Thus the B. & M., taking some B. & A. cars not uniform with its own, must not only run them in a train by themselves but must see that they are not mixed with Miller cars while being switched or assembled. According to the decision of District Judge Shiras in the Iowa (Voelker) case this rule applies with equal force to an empty car (in a yard) designed for use in interstate traffic.

The reasonableness of the Utah decision would appear to be clear, for—during the transition period at any rate—the law must provide for, or at least must not prohibit, the running of two vehicles on the same railroad which will not automatically couple to each other, and the transition period is still with us, as long as the law does not require automatic couplers on tenders. And where the fact of non-uniformity is obvious, as in the case of a Miller and a Janney, a man attempting to couple the two vehicles together is manifestly bound to exercise the same care that he would, for example, in coupling two link-and-pin couplers of very diverse height or shape; or in coupling a vertical plane coupler with a "bull-nose."

The statute of 1893 appears to have been designedly left rather loose. Such a construction was obviously wise, because in 1893 no one could foresee how rapidly or how fully a condition of entire uniformity would be developed. The law is loose in omitting locomotives from the coupler requirement. It is loose in omitting cars not carrying interstate traffic, but moving in the same train with cars which are thus loaded. In actual service railroads must run interstate and intrastate cars in the same train. The law left the roads free to settle this question themselves—and they have pretty nearly settled it.

The decision does not change anything. Now, as heretofore, the fact that one type of automatic coupler is used practically everywhere throughout the country in freight service is due, not wholly to the law of 1893, but to the fact that the railroads themselves saw that it was for their own best interest to agree on one type, the Master Car Builders'. In the matter of the air-brake the law gives the largest and most enterprising roads—those which first get a large number of cars equipped—power to coerce another road by refusing to receive those of its cars which are not uniform with their own. In the case of the coupler no such power is granted, but as a matter of fact the forces of commerce, or, in other words, the necessities of traffic, are gradually but surely exercising the coercion which will finally, without doubt, establish practically complete uniformity throughout the United States.

The assertion has been made that, as this court has permitted a road to go unpunished where two vehicles were coupled together, or attempted to be coupled, by couplers not of the "same kind or make," the judges would be equally ready to permit the use, without declaring the practice unlawful, of a Gould and a Tower, for example, which would not automatically couple with each other. This does not follow. In the first place an engine is not amenable to the law in any event. The rear end of the tender might have no coupler at all—nothing but a chain—and still be lawful. (The dissenting judge in the Utah case declared that the term "car" ought to be construed to include engines and tenders—a construction which from a practical standpoint would not be so very unreasonable in this case—but it is not likely that many judges would agree with him). In the second place, the Gould and the Tower, and all other M. C. B. couplers are put before the public as couplers conforming to a single well known and clearly defined type. Each one asserts, as a vital feature and a chief merit, its interchangeability with all other M. C. B. couplers. This being so, any claim of non-uniformity as between two couplers (of one type but of different "make") would of necessity be based on a claim of poor workmanship; and that claim would afford very unpromising material for the defense of a lawsuit.

Russian Railroads in 1899.

A recent official report on the Russian railroads includes not only the railroads in European Russia, as heretofore, but those in the grand duchy of Finland and of Asiatic Russia, which have not had place in the official Russian reports heretofore. The mileage in that vast dominion increased from 13,989 miles in 1880 to 33,149 miles in 1900, or 137 per cent., and the increase since 1895 was no less than 11,204 miles, and much more than in the 15 years previous, a yearly increment of 2,241 miles in the last five years, against an average of 530 in the previous 15 years. This is one of the chief indications of the recent economical development of Russia, which had for centuries shared but slightly in the progress of the rest of Europe. The recent railroad extensions are still small compared with the area and population of the country, and not to be compared with what is done in this country even in the dullest times, the new mileage of the five years being less than has been completed here in a single year; but the increased activity in Russia is significant as a new manifestation in the national life.

In 1880 less than 42 miles of the 13,989 in Russia were State railroads; in 1900, 22,590 of the 33,149 miles, or more than two-thirds. The change has been both by purchase and by construction; but in the earlier year the State had guaranteed dividends on most of the railroads, and so was directly interested in their prosperity and their proper management.

In the year 1900 the increase in the total Russian railroad system was 1,877 miles, against 4,911 in 1899, and 1,907 in 1898. Of the new railroad opened in 1899, 787 miles was in Asia, leaving but 1,090 miles in all European Russia with its 106,000,000 inhabitants—not more than has been built in one of our States in some years.

At the close of 1900 there were 3,818 miles of railroad under construction in the Empire, 1,998 miles of which was State railroad, and 450 was in Asia; but this does not include the Chinese Eastern Railroad, 1,600 miles of which were under construction at that time.

The report of the working of the railroads covers the year 1899, not 1900. In the former year there were 12,337 locomotives in Russia, or 38 per 100 miles of railroad. Their average service was 17,857 miles run per locomotive, but only 13,262 train-miles, switching, double-headers, etc., having absorbed the difference. Two of these engines were acquired before 1860, and 1,280 more before 1870, and 3,993 in the next decade. In the last six years (ending with 1900), 4,532 have been acquired. The number of compound locomotives is 4,688. Of the whole number, 5,647 are fitted for burning coal, 4,336 for petroleum, and 2,354 for wood. The eight burning peat in 1899 have disappeared from the list. All the 256 engines on the Asiatic Midland (east of the Caspian) burn petroleum, and of those on the Siberian Railroad 507 burn wood and 242 coal. The average weight of locomotives was 88,000 lbs.

In the matter of brakes, the Russian cars have plenty of room for progress. In 1899 no less than 9,224 passenger cars had only hand-brakes, against 6,744 with continuous brakes; but 4,379 were piped for air-brakes. Of 59,019 freight cars, only 81 were equipped with power brakes. The freight cars (four-wheeled) have cost on the average $663 each.

The report gives the heating value of different kinds of fuel, distinguishing for nine different kinds of coal. From this it appears that 66 lbs. of petroleum are equivalent to 100 lbs. of English coal, which is better than any of the Russian coal, though not much better than Donez coal, whether bituminous or anthracite, which are of nearly the same value. It takes 192 lbs. of Moscow coal to equal 100 of English, 142 lbs. of the Caucasus and 114 lbs. of the Ural coal. It is noticeable that the comparative values of the different fuels vary largely from year to year. The domestic coal used came chiefly from the Donez (over 1,800,000 tons), Poland (630,000 tons), and the Ural mines (200,000 tons). The total cost of locomotive fuel in 1899 was $17,723,000, which was 11.3 per cent. of the total working expenses, 10½ cents per train-mile and 7.6 cents per engine mile.

The traffic in 1899 (including for the first time the Asiatic railroads) amounted to 6,633 millions of passenger-miles and 22,739 millions of ton-miles. This is equal to a movement of 292 passengers and 996 tons of freight daily over the entire mileage worked. The density of the passenger traffic may be compared with the 107 each way daily in the whole United States in 1899, 260 in the trunk line territory (west of New England and east of Ohio), and 332 in New England, always remembering that Russia had 3,400 inhabitants per mile of railroad, and the United States about 400. The United States freight traffic the same year was equivalent to 906 tons each way daily. Leaving out the population of Asiatic Russia altogether, the Russian railroads had 62 miles of travel and 223 ton-miles of freight for every inhabitant of European Russia; the American railroads 194 miles of travel and 1,649 ton-miles of freight for every inhabitant of the United States. The two countries are comparable in extent, but not in industrial development. The average receipt per passenger mile in Russia was 0.623 cent—probably the lowest in the world, but a little higher than in 1898; per ton-mile it was 0.861 cent, which is also one of the low rates of the world. The average freight-train load was about 188 tons. In the United States the railroads received 1.925 cents per passenger mile and 0.724 cent per ton-mile, and the average freight-train load was 243½ tons.

The Asiatic railroads (included above) had a very light traffic, amounting to 253 millions of passenger miles and 1,000 million ton-miles, from which the total earnings were $6,680,000, or $3,258 per mile of railroad; while the European lines earned $9,472 per mile and the railroads of the United States $7,005. In European Russia the working expenses absorbed 64 per cent. of the gross earnings. Per train-mile the earnings were $1.68 and the expenses $1.07. On the Asiatic railroads the expenses slightly exceeded the gross earnings, which is not surprising at this stage of their existence.

In connection with the operation of the Russian railroads 8,610 accidents occurred in 1899, including 783 collisions. In these accidents 67 passengers and 388 employees were killed and 315 passengers and 1,747 employees injured.

The number of employees on the Russian railroads in 1899 was 489,405, or 16.7 per mile of road, against 4.95 per mile in the United States, where 15,822 passengers and 133,243 tons were carried one mile per employee, against 135,583 passengers and 46,501 tons in Russia. The average yearly pay per employee was $168 there; $560 here. The Russian employees engaged by the day, who are 36 per cent. of the whole force, earned on the average $173 per year; the regular force of track walkers and repairers, $103; the train-men, $300.

An example of the "personal equation" defeating mechanical safeguards has just been reported to the British Board of Trade by one of its inspecting officers as the result of his inquiry into an accident which occurred on the Great Central October 30 last. In this case the signalman made the mistake of endeavoring to lower his down main line signal when the road was not properly set, and the interlocking of the levers acted quite correctly in preventing him from doing so. A very slight examination of his levers would have shown the man why he could not lower the signal; but, instead of examining his frame, he at once concluded that the signal was out of order, and accordingly signaled the engineman past it by hand, with the result of causing a collision. The man had had two years' experience of signaling work and the company gave him a good character. He had been five hours on duty at the time of the accident. That signalman got, we suppose, a serious lay-off, or a fine, if not a dismissal. There are lever men in America who will warmly sympathize with him; or at any rate, the stories which we hear told of similar instances of hasty judgment in American signal cabins indicate that the mistake is an easy one to fall into. Here we do not have an officer of Royal Engineers to publish the details to the world; but the error is just as bad; and just as hard to prevent. How would it do to require hand signaling to be done always from a point on or near the ground? Then the signalman would have a little time to think while he was going down the stairs.

NEW PUBLICATIONS.

Railroad Correspondence File. By W. H. Williams, Assistant Secretary of the Baltimore & Ohio Railroad Company. Large octavo 190 pages, half leather. Baltimore: The Friedenwald Company, 1902.

In a very short introduction to this volume Mr. Loree says "Almost the first work that I did in the railroad service was the overhauling and re-indexing of the file in the engineer's office in which I was employed. I have been re-indexing files ever since." After he became General Manager of the Pennsylvania Lines West, Mr. Loree caused the files of the Superintendents' and Engineers' offices on the several divisions to be put on a uniform basis of indexing. He tried to extend the same system to the general offices, but it was found incapable of such expansion. Mr. Williams (who was then Mr. Loree's Secretary), was ordered to examine the methods in use in business concerns and in railroad offices, here and abroad. The result of his studies is the index which he has now brought out, and which has been entirely effective in the offices in which it has been introduced. It may be added that Mr. Williams, who appears on the title page as Assistant Secretary of the Baltimore & Ohio, is now Assistant to the General Manager.

The system finally selected by Mr. Williams is the Dewey decimal system. His serious work has been in drawing up a decimal classification for indexing and also making an alphabetical list of subjects. His classification is: 0, General; 1, Executive; 2, Finance and accounts; 3, Roadway and structures; 4, Equipment and shops; 5, Transportation and storage; 6, Traffic, rates; 9, Local facilities and affairs; 7 and 8 are left blank for special needs. We will give one or two examples of the application of the classification.

000 is General; 003 is Books and periodicals, newspapers, etc.; 003.1 is Information for publication; 010 is Officers and other employees; 010.01 is Letters of introduction; 010.1 is Meetings of staff. Again: 300, Roadway and structures; 300.01, Maps, drawings, plans; 300.011, Uniformity in coloring maps and drawings.

The alphabetical list of subjects gives, after each subject, the number used in the correspondence file, as has been illustrated. For instance, under A we find the heading "Accounts-Auditing," under which is the sub-heading "Auditing committees," the file number of which is

220,011. Both divisions of the volume are conveniently arranged for quick reference, and well printed on durable paper. We would suggest that anybody who is thinking at all of the possibility of overhauling his method of filing and indexing should get this volume, which we assume can be had by addressing Mr. Williams.

The How and Why of Electricity. A book of information for the non-technical readers. By Charles Tripler Child. 12mo., 128 pages. New York: Electrical Review Publishing Co., 1902. $1.

Mr. Child was a writer of uncommon simplicity in a subject to which to most of us is pretty complicated. He informs us in a preface of a dozen lines that he did not set out to tell what electricity is because he does not know. He has attempted merely to tell something of its properties; how it is developed, handled, controlled, measured, and set to work, and to explain how familiar electrical apparatus operates. The little book is elementary and anybody, even an ordinary civil or mechanical engineer, can understand it. It gives us the fundamentals of the apparatus in most common use, such as telegraph, telephone, dynamos, motors and lamps. It describes the principles of catching and harnessing the electric force but attempts no analysis beyond the capacity of the layman.

TRADE CATALOGUES.

Mechanical Ground Connections and Leadout Appliances.—This is the title of Section 2 of the Union Switch & Signal Company's Catalogue, other sections of which have been recently noted in the *Railroad Gazette*. The present pamphlet fills over 100 pages and shows in detail the great variety of pipes, wires, wheels, chains, cranks, foundations, pipe and wire carriers, and other leadout parts made by this company. The Jones wire compensator is shown. This, as well as the other fixtures, including cast-iron and concrete foundations, are fully illustrated.

The Westinghouse Electro-Pneumatic Control on the Brooklyn Elevated.

The Brooklyn Elevated Railway Company has just given an order to the Westinghouse Electric & Manufacturing Co. for 210 multiple control equipments. When the Brooklyn company decided to use electricity on its elevated system it asked electrical manufacturers who had developed systems for multiple unit control to equip model trains for test. The companies furnishing equipments were the Westinghouse, the General Electric and the Sprague. Records were kept of miles run, of accidents, of cost and time required for repairs, of the convenience in operation, and other matters that might influence the decision. The result of this investigation has been the placing of the order mentioned above. All steam locomotives now in use will be in a short time replaced and trains will be operated by the Westinghouse system. In addition to the order for 210 cars, the company has already purchased about 150 equipments which have been in satisfactory operation for nearly a year.

The Westinghouse system, as most of our readers probably know, involves the use of compressed air for moving the current-controlling apparatus, electro-magnetic valves governing the admission of air to the controlling cylinders and low voltage electric circuits for controlling the action of the magnet valves. The connections for the low voltage circuits are the only ones which have to be established between the cars of the train, no air connections being required outside of the ordinary brake hose. A complete equipment for each motor car consists of two or four electric motors, a controller similar to the controllers used on ordinary street cars, and one or two motormen's controlling switches, from any one of which all the car controllers on the train may be operated. The car controller is similar in design to the ordinary form of hand controller which has been successfully used on electric street cars for many years. It consists essentially of two drums which revolve in bearings, and stationary contact fingers which make contact with points upon the revolving drums. The large, or main drum, opens the main circuit and makes the motor and resistance combinations; the small drum reverses the motors. A multiple control switch is placed at one or both ends of each motor car and by means of the one at the front of the leading car the motorman controls the action of the controllers on all of the motor cars in the train. Some of the points of superiority of this system over other systems are stated as follows:

It employs compressed air for operating the control apparatus—a powerful and reliable agency. It uses the standard type of controller and standard types of valves and magnets, the latter having been used for years in the operation of the Westinghouse electro-pneumatic system of switches and signals. It is the only system in which the control circuit is isolated from the main power circuit. The control circuit is, therefore, not affected by a momentary interruption of current due to ice and sleet on the rails, or other causes. With the low voltage current, grounds and short circuits at the connections between the cars in stormy weather or fires resulting from high voltage circuits through the train are eliminated. The current for the motors is collected from the third rail, led through the local car controlling apparatus to the motors, and then back to the service rails, and does not pass from car to car.

The motor circuits on any car are automatically opened in case of excess current and they can all be simultaneously closed at the will of the motorman. All controllers are automatically turned off by the application of the automatic air-brakes, which is an important point since in case of a train breaking in two the brakes are automatically applied and at the same time the power is shut off. With other systems under some circumstances, it has been found impossible to shut off the power from some of the cars, while in the Westinghouse system there are a number of ways in which this may be accomplished. Both controllers and circuit breakers are opened by a breaking in two of the train, this action being independent of and in addition to the effects obtained by the application of the air-brake. The controllers may be operated by hand, thus permitting the train to run to a terminal station in case of any derangement of the controlling apparatus. The operation of both brakes and controllers is effected by a single air hose connection between the cars, the air compressor which furnishes air for the brakes also furnishing air used to operate the controllers.

The Brooklyn Elevated will equip all its new cars with four motors each. The 150 cars now in use equipped with the Westinghouse system have each two motors. The trains on the road are made up of five or six cars, two or three of which are usually motor cars. When these trains reach the suburbs they are broken up into smaller units of one or two cars, each containing a motor car, and the smaller trains branch off on different divisions. By the use of this system it is possible to operate cars individually, or to make them up into trains of any length. Also, any proportion of motor cars may be used, making it possible to obtain any desired acceleration.

Messrs. Prouty and Hines at Philadelphia.

At the 15th annual meeting of the American Economic Association, held at Philadelphia last Friday and Saturday, one of the most interesting topics discussed was Public Regulation of Railroads. The chief disputants were Hon. Charles A. Prouty, Interstate Commerce Commissioner, and Mr. Walker D. Hines, Vice-President of the Louisville & Nashville Railroad. The views of these gentlemen, as our readers know, are directly opposed, and each is the most vigorous among all the exponents of his side of the question.

Mr. Prouty said that he could not discuss actual national regulation of railroads, as there was none. The need, however, was greater latterly than ever before, since with the consolidations, control had been vested in a few powerful interests. Discrimination, the evil of reckless competition, had given place to extortion in the form of very general increases of rates over the entire country. These were individually small, but in the aggregate constituted a heavy additional tax on industries and commerce. Railroad consolidations had made them possible.

Because this additional tax was borne by a great number of people and because these people were the consumers and not the shippers and therefore without direct recourse through the courts, there was practically no legal protection offered.

The only remedy was a commission to act for the people, investigating their causes and with power to adjust their wrongs, by determining and fixing reasonable rates when called upon to do so. The orders of such a court should be enforced without opportunity for appeals. Such an expert commission with such powers is necessary because the subject is too intricate and technical for the courts, and because the wrong is of a peculiar nature so that it cannot be held in suspense and stated at a specific amount of damage while the investigation goes on. There should be a Commerce Court of high dignity, not a Commission. From this court appeal on questions of law and perhaps of fact should lie to the Supreme Court of the United States. Such a tribunal would not be confined to reviewing and enforcing the orders of a commission, even though its duties were limited to the regulation of interstate railroads. It happens continually that matters arise which require the application of immediate relief, which can only safely and properly be given through the summary process of a court. It is quite probable, too, that such a court might be available in dealing with monopoly in other branches of interstate commerce than railroad transportation.

Mr. Hines' position was that the powers sought by Mr. Prouty for a commission were extraordinary and most dangerous. He said that, despite all assertion to the contrary, the definite scheme deliberately adopted by Congress for correcting unjust and unreasonable rates has never yet proved insufficient. A great many of the commission's orders have been complied with. It has chosen to take but comparatively few of those orders into court for enforcement. When it has resorted to the courts it has developed practically without exception that the particular orders were improper and ought not to be enforced. This was not due to any lack of adequate power in the commission, but was due to its erroneous methods. If those interested would take the trouble to read the decisions of the courts in these cases they would be astounded to find how generally the commission has been wrong on practical and economic questions as well as with regard to the extent of its powers under the act.

The commission's orders without a single exception have been enforced by the courts when they have been meritorious. When the courts have declined to enforce them it has been on the ground of the defects of the order of the commission and not because the order was not within the powers of the commission. Since the decision of the so-called Maximum Rate Case in 1897, when a general rate-making power was denied, the commission has entered on an aggressive and unbecoming campaign for more power. Most of the sentiment in favor of giving them the rate-making power desired is based on two misconceptions; first, that the power of the Government to correct unjust and unreasonable rates was destroyed by the Supreme Court in the Maximum Rate Case and second, that the proposed rate-making power would prevent secret rate cutting.

This issue should be squarely faced. It is the question whether Congress shall give the commission the power to make rates just as generally as it may choose to exercise the power, when that power is one which, in the nature of things, cannot be adequately supervised by the courts, and will leave the commission the final arbiter, except in cases amounting to confiscation. If the Government, while permitting the railroads to be run by private capital, should undertake directly to appoint the traffic managers of the various roads, such action would be regarded as wholly indefensible; yet precisely the same result would be reached if the commission were given the power in question, because it could then, by its own will, assume the position of traffic manager for every railroad in the country to whatever extent it might choose to occupy that position. The only relief the railroads would have would be that if the commission's acts in the capacity of traffic manager were flagrantly and palpably oppressive they could be corrected, but otherwise the commission's discretion would be supreme. It is an inversion of all the principles of justice to continue to hold the railroad companies to all the duties and responsibilities and risks of the business, and at the same time subject them to the practically unlimited interference of a tribunal of this character, when no guaranty whatever is afforded against the mistakes of that interference. Under the present method the mistakes of the railroad companies can, in every instance, be corrected, whereas under the proposed method the mistakes of the commission could not be corrected anywhere.

Prof. Emory R. Johnson, of University of Pennsylvania; Prof. B. H. Meyer, of the University of Wisconsin, and Mr. J. Shirley Eaton, Statistician of the Lehigh Valley Railroad, opened the discussion, which was taken up warmly by the members of the Association. The vital issue raised by Mr. Hines, whether the commission had in any case been overruled except upon the merits of the cause appealed, was not directly answered by Mr. Prouty. The latter urged that, if all the powers were adequate as claimed, there could be no harm in embodying them in three or four supplementary clauses of the law which would place them beyond question.

Premiums for Punctuality—State Railroads of Belgium.

The State Railroads of Belgium have an elaborate system of premiums that are payable, upon the accomplishment of certain results, to all who have to do with the running of trains. It has been in force since 1871—good evidence of satisfactory results. The premiums are divided into three classes:

1. For saving coal and oil on locomotives. 2. For saving coal and oil on stationary engines. 3. For maintaining schedule time in working trains.

The first is one with which American railroad men are familiar. The second may also be passed over as affecting only the men in the power plant. But the last is of interest not only from the novelty of such a system of premiums on this side of the Atlantic, but also because of the large number of men directly contributing to the running of trains on time. These premiums are distributed among the engineers, firemen, brakemen, conductors, guards, instructing engineers, inspectors and station agents.

The premiums for regularity are intimately connected with those based on the economical use of fuel and oil, as the two might be opposed to each other.

The coal and oil premiums affect a larger number of men than they ordinarily do in this country, embracing engineers, firemen, engine-house foremen, machinists and instructing engineers; also superintendents, foremen and supervisors of the main shops and the chief of the section in charge of the coal tests. These premiums are awarded quarterly. The amounts of fuel and oil are allotted per unit of work of the engine. If there is a saving, the right to participate in the premiums belongs to the interested employees, and their value is dependent upon the consumption during the quarter and the amount which it is less than that allotted to the service.

When the consumption exceeds the quantity appropriated for the work, the men interested not only receive no premium, but may even be subjected to penalties.

As for the inspectors, the results obtained from the different locomotives having headquarters at the same engine house, are grouped, and the losses of those engines exceeding the appropriation are deducted at five times their value, from the total savings of engines showing a gain. The difference forms the base of what is called the engine house savings.

Train service.—It is laid down in the rules as a fundamental principle that punctuality is one of the most essential conditions. When a delay occurs the train crew must exert every endeavor to make up the time lost. In order to encourage the men to do this, a special premium, in addition to the one ordinarily awarded for the run, is given to engineers and firemen for the time made up in case of delay. This premium is so calculated that it is equal to three times the amount which would otherwise have been gained, except for the increase in coal consumption due to an increase in the speed of the train On the other hand, engineers and firemen are liable to a

fine in case time is lost through their own fault, and which they have not made up, in whole or in part, when it was within their power to do so.

These premiums for time made up are paid out of a supplementary credit, and result in an increase of income for the men interested.

Brakemen and others on the inclined planes at Liege do not participate directly in the premiums paid for time made up; but the reserves put aside for the payment of their premium are dependent upon the increase and are proportional to the amounts paid to engineers and firemen. They are, therefore, interested in preventing delays and in the making up of time lost by trains.

This is not yet a definitely settled matter and will only become so when the expected results are forthcoming. These are expected to be a marked improvement in the regularity in the running of trains.

A premium is awarded to engineers and firemen for:

A. The running of trains of all kinds, as well as light locomotives.

B. The running of certain important trains, such as the International expresses.

C. The time made up when delayed. When the delay is found to be the fault of the engineer and firemen they are subjected to a fine proportioned to the amount of time lost. An exception is, however, made in the case of fog, when no account is made of the delays due exclusively to that cause.

It must not be inferred from this that running at unlimited speed is permissible. The speed of trains is limited to certain maximums which must not be exceeded even in the case of delays.

Again, independently of the penalties already cited, the management has recently decided to deduct one franc from the premium due to any engineer who shall be the cause of the breakage of drawbars or coupling attachments.

The regulations are substantially as follows:

"From the moment when a delay occurs to a train the crew must at once exert every endeavor to make it up, and do this in as short a time as possible, and especially before arriving at a junction point.

"In order that the matter may receive consideration the time made up should be at least one minute for each 12 miles run by fast passenger trains, starting from the point where the first delay occurred, and one minute for each six miles run by other classes of trains.

"The loss of time due to the slow running of trains to which no cause can be assigned outside the locomotive service, will be imputed to the fault of the engineer and firemen.

"Finally all losses will be imputed to the negligence of the guards for which they are responsible and which is not made up when it lies within their powers to cause it to be done."

As an increase in speed usually calls for an increase in fuel consumption, the premium for regularity of running is made worth three times as much to the engineer as the loss arising from an increase of coal consumption. It is, therefore, made to the interest of the engineer to run his train on time.

The awards to conductors and brakemen are shared equally by the interested parties for each district, one-half going to the train crew and the other half to the yard men. But if any one of these employees is negligent the premium otherwise due to him is withheld and divided among his associates. Heating of boxes is justification for withholding a premium. If it is due to lack of care in oiling, the engineer or trainman loses his premium. If it is due to a bad condition of journals or faulty repairs, it is the inspector who suffers the loss. The penalties for this class of negligence are as follows: Heating due to the negligence of engineers, 0.03 franc (6 cents); heating due to neglect in engine house, foremen 0.03 franc, assistant 0.02 franc, engine house superintendent 0.03 franc, and to other helpers engaged 0.02 franc. Heating due to carelessness in the main shops, foremen 0.03 franc, superintendent 0.03 franc, and 0.03 franc for the foremen of the erecting gangs.

An excess of speed in running down grades over a division having an undulating profile, is cause for withholding of the premium for fuel saving if it is shown that this excess of speed was due to slow running, that could have been avoided, on adverse grades. In case of double headers the loss is divided between the two engineers.

The rules for the payment of these premiums are worked out with considerable elaboration, since there is not a uniform distribution of the amounts among all who are interested. The division is made pro rata according to units of work attributed to each man per day or per other interval of time. The value of one of these units varies since it is the quotient resulting from the division of the amount to be distributed by the total number of units of work attributed to the interested parties.

In the determination of these units of work the stations are divided into six groups according to their respective importance, and the employees participating are divided into five classes.

The arrangements can, perhaps, be shown by an example taken from a station schedule:

	Units of Work for—				
Station group.	Station master.	Assistant station master.	Inspector and signalmen.	Porters and baggagemen.	Workmen.
1	16	9	4½	3	2½
2	13	8	4½	3	2½
3	9	6	3½	2½	2
4	6	4	3	2	1½
5	3	..	..	2	1½
6	2	..	..	12	1

These figures show the maximum, from which reductions are to be made. The reductions or penalties can be expressed by the retention of the premium for a quarter, month or a certain number of days in units of work.

An allowance of 3 minutes on passenger trains and 15 minutes on freight trains is allowed so that crews may arrive ahead of or behind the schedule time and not incur any penalty.

Mr. Weissenbruch, an officer of the administration, informs us that the premium system has produced good results; and he says that the year 1902 the administration expects to pay out in premiums something over $225,000, as shown by the figures below. This is a very considerable sum, indicating by its size that the scheme is no mere superficial coddling device.

Premiums for Regularity (Less Deductions for Penalties); Estimates for the Year 1902.

	Francs.
Service of operation (station men, etc., as explained above)	590,333
Enginemen	272,741
Firemen	175,592
Brakemen	91,780

The premiums for regularity are paid for freight trains as well as for passenger trains. Independently of the penalties provided in the printed instructions, referred to above, the administration, in order to put an end to the enormous breakages of coupling attachments on passenger trains has decided quite recently that 1 franc will be retained against the premiums of every engineman who may be known to be responsible for the breakage of couplings on a passenger train.

Locomotive Erecting Shops for the Eastern Railway of France.

According to the *Revue Générale des Chemins der Fer* the Eastern Railway of France has recently completed a new erecting shop at Epernay. The general plan is that which has been adopted in the best shops of the United States for some time, namely, the longitudinal track system with traveling cranes for lifting the engines.

There is little about these shops of interest beyond some of the details of construction. The entire building

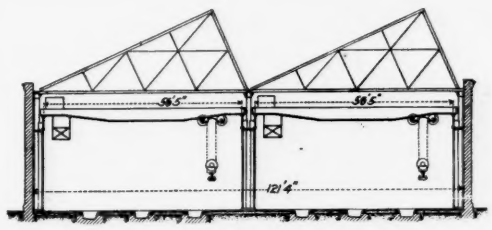


Fig. 1.—Cross-section of Locomotive Shop—Eastern Railway of France.

is made of fireproof materials, the framework is of iron and the roof of sheet metal and glass. As the building extends from east to west, a saw tooth roof is used, with the steep side facing the north and covered with glass. This type of roof affords a most excellent light, for the direct rays of the sun do not enter, and the light reflected by the white walls is of remarkable intensity and casts no shadow. The windows are large and high and are glazed with crinkled glass.

Fig. 1 is a section through the building showing the

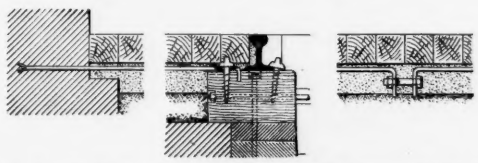


Fig. 2.—Method of Staying Floor Stringers—Shops of Eastern Railroad of France.

arrangement of the central row of pillars which carry not only the weight of the metallic framework and the roof, but also the track and one end of the 33 tons traveling cranes. The locomotives are handled to and from the erecting tracks by means of cranes.

The floor is covered with wood because it is considered warmer and healthier for the men than stone or earth, and is not easily broken. The blocks are treated oak cubes measuring 3.94 in. on the edge, and are set with the grain vertical on a bed of river sand 7.88 in. thick. In order to avoid the thrust of the paving against the stringers carrying the pit rails, these stringers are stayed by flat iron ties, as shown in Fig. 2.

There are a few interesting details connected with the pipework. One is the expansion joint, used above the boilers, which consists of a stuffing box, gland and slip ring that bolt in between the two sections of pipe whose expansion is to be taken up. Within the shop the steam pipe is carried on ordinary sling hangers, but in passing from the boiler house to the erecting shop it is carried on suspension bars.

With the exception of the expansion joints mentioned above no other provision is made for expansion, principally because of a metallic pipe joint that is used, and which is shown in Fig. 3. This joint is made by means of a lozenge-shaped copper washer, fitting into grooves in the pipe flanges and against which the latter are tightly bolted.

Three kinds of pipe covering are used:

1. A covering of straw rope. The first covering is formed of tar paper wound about the pipe in three or four layers. Over this are rolled two or three layers of straw rope. Over the whole is wrapped a layer of three or four thicknesses of tar paper. In exposed places the whole is protected by a sheathing of light sheet metal.

2. A covering of soft rope and ochre. This covering is formed of a soft straw rope dipped in semi-liquid mortar made of brick clay with about 10 per cent. of horse manure. This rope is wound about the pipe in a helix and is then covered with a layer of the same mortar but made a trifle thicker.

3. Covering of hair insulation. This covering is laid

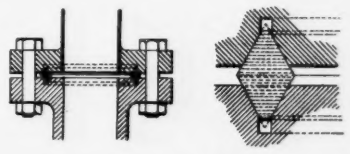


Fig. 3.—Metallic Steam Flange Joint—Eastern Railroad of France.

on the pipe to the thickness of about 1½ in. and is made of 40 lbs. of refractory white earth of the first quality; 25 lbs. of refractory white sand; 1½ lbs. of hair, and 33½ lbs. of water. Over this there is applied a coating made of 1 lb. of linseed oil and ½ lb. of blacklead, put on in three coats.

The shop has four 30 ton traveling cranes. Although the shop is fitted with electric power transmission each of these cranes are operated by separate steel cables.

The electric power transmission is rather unique as viewed from an American standpoint on account of the large units that are used in the generating plant, which consists of a single continuous current dynamo capable of developing 66,000 watts at a voltage of 110. At first the current for power purposes was generated by three Gramme dynamos of 24,000 watts each. The increased use of electricity for power purposes, however, led to the installation of this powerful machine, while the old machines are reserved for lighting purposes.

The use of portable machines is extensive and there

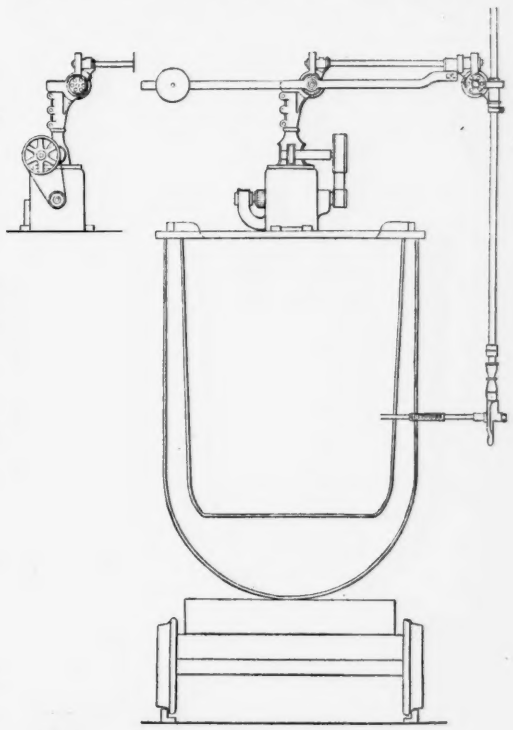


Fig. 4.—Machine for Drilling and Tapping Fire-box Sheets—Eastern Railway of France.

are numerous points scattered throughout the shops and in the pits where connections for the motors may be made. The system in use is the two wire. In all there are 40 places in the pits where such connections may be made.

The electrical driven tools include three grind stones requiring 2,000 watts for their operation; eight emery wheels requiring 2,800 watts; a portable machine for boring cylinders and belt driven by a motor which rests upon the floor, 3,300 watts; a valve seat facing machine in which two rotating heads carry the cutting tools across the valve seat, taking 3,300 watts; a portable winch for moving locomotives; a portable forge; and a machine shown in Fig. 4 for drilling and tapping the fire-box sheets for stay-bolts and screwing the same into position. This involves the turning of the fire-box upside down so that the bottom of the mud ring presents a flat surface upon which the motor platform may be placed. The working mechanism is driven by miter gears and is suspended from above, its weight being counterbalanced by a weighted lever.

The shops are heated by steam taken from the boilers and reduced in pressure to 39 lbs.

TECHNICAL.

Manufacturing and Business.

Fire destroyed a lot of machinery in the plant of the Pressed Steel Car Co. in Gass avenue, Allegheny City, Dec. 25.

The new plant of the Lima Locomotive & Machine Co. is about finished, and the company expects to occupy it by Feb. 1.

O. W. Bain is reported in Pittsburgh representing the New South Wales Government. He expects to place important contracts for electrical equipment for tramways.

Fred Small, nephew of H. J. Small, General Superintendent Motive Power Southern Pacific Ry., and lately Consulting Mechanical Engineer of the Mexican Central Ry., has become associated with The Holland Co., Chicago.

The Steele & Condict, Incorporated, was incorporated in New Jersey Dec. 26, with a capital stock of $150,000, by Nathan W. Condict, Lee Condict and Henry N. Smaltz. The company is to do bridge building and general structural work.

The Economy Car Heating Co., Portland, Me., has just made a contract with Frank Robinson, Master Mechanic of the Maine Central Railroad, Bangor, Me., for making and selling the Robinson exhaust nozzle, for which a patent was granted to Mr. Robinson on Dec. 16 last.

On account of the death of Joseph M. Wilson, the firm of Wilson Brothers & Co., Architects and Consulting Engineers, Philadelphia, composed of Joseph M. Wilson, Henry W. Wilson, John McArthur Harris and Howard L. Richards, has been reorganized under the firm name of Wilson, Harris & Richards.

J. W. Place has been appointed Western representative of the Economy Car Heating Co., of Portland, Me. Mr. Place was for some time an engineer on the Illinois Central Railroad, and until Nov. 30 last was Western representative of the Talmage Mfg. Co., of Cleveland, Ohio.

Isaac G. Johnson & Co., of New York city, was incorporated Dec. 29 in New York State with a capital of $1,000,000, to make and sell iron, steel, manganese, copper, etc. The Directors are Elias M. Johnson, Isaac G. Johnson, Gilbert H. Johnson, James W. Johnson and Arthur G. Johnson, of Spuyten Duyvil, N. Y.

It is said that negotiations for sale of a controlling interest in the Electric Storage Battery Co., the Storage Battery Co. of England, and the Stanley Electric Co., are practically completed. It is said that Moore & Schley are conducting the negotiations. William C. Whitney and Thomas F. Ryan have been largely interested in the companies whose control is expected to be sold.

At the last convention of the Master Car & Locomotive Painters' Association the Committee on Tests reported as follows concerning Durable Metal Coating (classed as carbon black): "Where unbroken from loose under (rust) scale, this paint is still elastic enough to award it the claim of being durable." We are informed that it stood a severe acid test without injury. Where the Durable Metal Coating, made by Edward Smith & Co., New York, is applied to steel frames of buildings, bridges, or metal work it will preserve it for years against rust.

The Chicago Pneumatic Tool Company have issued invitations to all of their representatives, both of this country and in Europe, to attend a general meeting which will be held at the general offices of the company, 1010 Fisher Building, Chicago, on Jan. 5, 1903. It is proposed at this meeting to have the reports of the representatives dealing with the trade conditions in the various parts of the world gone over very carefully and a more thorough understanding of the requirements of both the foreign and domestic customers of the company will undoubtedly be secured.

O. C. Gayley has resigned his position as General Agent of the Safety Car Heating & Lighting Company, in order to accept a position as Manager of Sales of the Eastern district of the Pressed Steel Car Company. He will leave the services of the Safety Company some time between the 15th and 20th of January and will immediately take up his new duties. Mr. Gayley was born in West Nottingham, Cecil County, Maryland, on April 9, 1860. He entered the Engineering Department of the Pennsylvania Railroad in 1880 and remained on that road for eight years, leaving there to become one of the Division Engineers of the Philadelphia & Reading, where he remained for two years. He then accepted the position of General Manager of the Kansas City Car & Wheel Company, at Kansas City, leaving there to become General Agent of the Missouri Car & Foundry Company, of St. Louis. He resigned that position in April, 1893, to join the forces of the Safety Car Heating & Lighting Co., and has been with the latter company since that time, with headquarters in New York city. Mr. Gayley is a prominent member of the Engineers' Club, having served for some time on its Board of Governors, and has also served on the Executive Committee of the Supply Men's Association in connection with the Master Car Builders' annual convention. He is very well known in railroad and supply circles, and will carry with him to his new position the best wishes of his former associates and a host of friends, all of whom congratulate the Pressed Steel Car Company upon having secured his services.

The York Manufacturing Company, of York, Pa., builders of refrigerating apparatus, are equipping their works for electric power distribution, and have recently purchased from the Westinghouse Electric & Manufacturing Co. a number of direct-current, 220-volt motors. The Union Abattoir Company, of Baltimore, is also making large additions to the electrical equipment for power distribution in its plant. A 200-k.w., 7,200 alternations, two-phase engine-type generator, with exciter, and two 40-h.p., type "C" motors have recently been bought through Dr. W. A. Drysdale, Constructing Engineer, of Philadelphia, from the Westinghouse Electric & Manufacturing Co. This machine is to be installed as an addition to the present plant.

The New York Edison Company has contracted for new generators, rotary converters and transformers from the Stanley Electric Manufacturing Company. The contract includes four 2,000 kilowatt S. K. C. rotary converters. The transformer equipment to accompany the same consists of twelve 800 kilowatt S. K. C. static transformers of the air-blast type and four auto-regulators. The largest rotaries hitherto built are the 1,500 k.w. units in the Manhattan Railway sub-stations. In addition, the contract calls for ten 1,000 kilowatt S. K. C. rotary converters with thirty 400 kilowatt S. K. C. static transformers of the air-blast type, and 10 auto-regulators for the various sub-stations of the Edison Co.

Iron and Steel.

The number of stockholders of the U. S. Steel Corporation has increased 21,407 in 15 months. The total number of names now on the company's books is 53,894.

Reports from Pittsburgh state that the American Sheet Steel Company has closed a contract to sell to the National Roofing & Corrugating Company next year $6,490,000 of sheet steel.

The Pavonia Iron Works, with principal office in Jersey City, has been incorporated with $125,000 capital to make iron, steel, etc. The names given as incorporators are: Henry J. Kingsbury, John A. MacPeak and Wm. F. Bidell.

The Dominion Iron & Steel Co. has decided to discontinue the construction of its steel rail mill at Sydney, Cape Breton, for the present, but will use it to make structural steel, as the demand for rails in Canada is too small. The machinery necessary to change this plant is now being received from Germany and it is expected that the plant will be making structural material by next May.

The new plant of the Monterey Iron & Steel Co. at Monterey, Mexico, recently mentioned in the *Railroad Gazette*, is to be put in operation early next month. The plant, when completed, will have cost $10,000,000. Particular attention will be given to the manufacture of mining machinery, as Mexico now depends principally upon the United States for machinery for her mines, sugar plantations and mills. Some large contracts for railroad steel, including rails, have already been placed with the company by Mexican roads.

The John Fritz Medal.

The Board of Directors of the American Society of Civil Engineers has named the following members of the Society as members of the Board of Award for the John Fritz medal: J. James R. Croes, Robert Moore, Alfred Noble, Chas. Warren Hunt.

More Power at Niagara.

The Ontario Parliament is considering the application of the Toronto-Niagara Power Co., which wants a franchise to use the water of Niagara River above the Falls to generate power. Christopher Robinson, K. C., H. H. Macrae, Frederick Nichols, H. M. Pellatt, J. J. R. Croes and Hugh L. Cooper are interested. It is said the new company proposes to develop 100,000 electric horse-power and that the privileges which it asks will not interfere with the service of the existing companies.

U. S. Steel To Get Troy Plant.

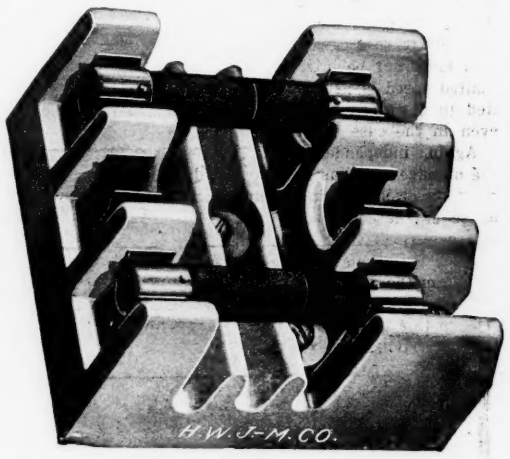
William F. Donovan, President of the Troy Steel Production Co., has announced that the Breaker Island plant has been sold to the U. S. Steel Corporation. It cannot be stated whether the new owners will continue the plant. Under the direction of the Supreme Court, this plant was sold at auction last August to satisfy a judgment held by the Guarantee Trust Co. of New York as trustee of the bondholders. Mr. Donovan, representing a syndicate, secured the plant at $525,000 and incorporated the Troy Steel Production Co. A large force of men has since been engaged in getting the plant ready for operation.

An Electric Railroad for Manila.

Through the Bureau of Insular Affairs of the War Department, the Philippine Commission asks for bids for an electric street railroad 35 miles long for the city of Manila. The terms of the competition provide for a franchise not to exceed 50 years; the rate of fare not to exceed 7½ cents gold for first-class passengers, and 5 cents gold for second-class passengers, and not less than 1½ per cent. of the gross earnings to be paid to the city. Bids are to be opened in Manila, March 5, 1903, and construction must begin within six months after the contract is let and the road be completed in 20 months thereafter. The proposed route is arranged to give a satisfactory system of transportation from any part of the city to any other part without passing through any territory which would not furnish its quota of passengers, and it reaches two race tracks and a baseball park. The full text of the enactment of the Commission concerning the project may be obtained from the Bureau of Insular Affairs, War Department, Washington, D. C., where a map of the proposed road may be seen.

The Noark Fuse Block.

In the "Noark" branch blocks the object has been to economize space and at the same time produce a branch block in which the arrangement of the wires and fuses should be absolutely safe, both in the operation and manipulation of the device. To obtain this result the branch fuses are so arranged that each of the terminals



in which the branch fuses are received and to which the branch wires are connected are separated from the adjoining terminals by heavy partition walls, high enough above the contacts to prevent anything being laid across from contact to contact and cause short circuiting. The main wires to which the branch block is connected, instead of passing across the block at the end of the branch fuses, are arranged to traverse it in suitable grooves placed in the porcelain block between the terminals of the branch fuses. In this way a great economy of space is effected, while at the same time the block can be easily and readily installed and the manipulation of the fuse devices for a removal or insertion is entirely safe. The "Noark" fuse blocks are made by the H. W. Johns-Manville Company, New York.

Ferry Boats for the Santa Fe.

One of the Santa Fe's new ferry boats, of which two are under construction, was launched at Dickie's Ship Yard, Alameda, Cal., Dec. 18. The sister boat will be launched in January. The vessels are of wood, copper sheathed. Their dimensions are 175 ft. long on keel; 200 ft. over all; 58 ft. beam, and 17 ft. depth of hold. They are double decked, and will be driven by screw propellers.

Copper Sheathed Cars for the New York Subway.

The contract for 500 cars for the New York Rapid Transit Subway for November, 1903, delivery, has been let. The St. Louis Car Co. will build 200, and the Wason Co., the John Stephenson Co., and the Jewett Car Co., 100 each. It is understood that 300 or more additional cars will be built before the opening of the subway. They will be vestibuled, and 51 ft. long over all, and the car bodies will be covered with copper sheathing in its natural color, by the Metal Plated Car & Lumber Co., of New York.

William R. Trigg Shipbuilding Co.

Lilburn T. Myers, Vice-President and Manager, has been appointed Receiver for the William R. Trigg Shipbuilding Co. The amount of claims and liens already filed is said to aggregate $150,000. The motion for the appointment of a receiver was made by S. H. Hawes & Co., of Richmond. The company has outstanding $1,000,000 each of first and second mortgage bonds, $750,000 of preferred stock, and $1,500,000 of common stock. Plans for the reorganization of the company were under way when the receivership was made.

The American Steel Foundries Company.

Last August we gave an account of the organization of the American Steel Foundries Co. It includes the American Steel Castings Co. (several plants in Pennsylvania and Ohio); Reliance Steel Castings Co., Limited, Pittsburgh; Leighton & Howard Steel Co., St. Louis; Franklin Steel Castings Co., Franklin, Pa.; Sargent Co., Chicago; American Steel Foundry Co., St. Louis. The reader familiar with the trade will see that the consolidation takes in the most important makers of steel castings, commercially, and covers a large percentage of the possible output. The board of directors includes representatives of some of the largest consumers, as the American Locomotive Co., the American Car and Foun-

dry Co., the United States Shipbuilding Co., the United States Steel Corporation and several railroads. The various foundries have been overhauled, capacity increased, processes standardized and improved and administration costs reduced. The foundries are full for months ahead, and the booking of orders is only a question of capacity. In the quarter just ended the net earnings were about twice the dividend (six per cent. per annum) on the preferred stock and there is no bonded debt. The best men of the companies remain in active charge of the affairs of the consolidation.

To Make Switches in Colorado.

According to despatches from Pueblo, Colo., an eastern syndicate has been formed with a capital of $500,000, and with a large cash working fund, to build a railroad frog and switch plant at Pueblo. It is said that negotiations have been completed to buy 25 acres of land which will be used as the site.

Pressed Steel Car Changes.

A reorganization of the Sales Department of the Pressed Steel Car Co. has been announced. O. C. Gayley, lately with the Pintsch Light Co., has been appointed manager in the eastern district, with headquarters in New York; C. E. Postlewaite, in the central district, with headquarters in Pittsburgh; J. H. Mitchell, in the western district, with headquarters in Chicago. A new office, assistant to the president, has been created and F. H. Rapley appointed. He was formerly resident engineer of the company in London.

Electric Power from the Hudson.

The Albany Electric Illuminating Co. and the United Traction Co. had entered into contracts with the Hudson River Water Power Co. for all the power that the latter company is capable of generating in its several plants on the upper Hudson River, except that power heretofore sold to the General Electric Co. for transmission to Schenectady, which latter amount does not exceed 10,000 h.p. daily. The Hudson River Water Power Co. has under construction and in use several dams along the upper Hudson, the largest being at Spier Falls. Its daily output will be 60,000 h.p.

The Wagon Top in England.

The Great Western (England) is now trying a wagon top boiler on one of its newest express engines. Owing to the low English clearance there is no dome. The wagon top is already in use on some goods engines, but so far the Great Western has only one express engine so fitted.

A New Bridge and Iron Company.

A Milwaukee despatch says a plant for bridge building and structural iron construction will be built by a company being financed by B. L. Worden and C. J. Allen. The capital stock will be $100,000, fully paid in. Mr. Worden has been construction engineer of the Wisconsin Bridge & Iron Co., from which position he will retire Feb. 1.

Large Electric Plant for Mexico.

Sir Weetman Pearson & Son, English contractors, who have large investments in Mexico, have a concession from the Mexican Government to establish an extensive system of electrical energy. Despatches from Mexican City say that they have the necessary plans completed for expending $12,000,000 gold in constructing an electric generating plant in the mountains of the State of Puebla, where there is an abundance of water power. About 80,000 h. p. will be available for power and lighting in the City of Mexico.

Consolidated Lake Superior Company.

The directors of the Consolidated Lake Superior Company, which had just effected a loan of $3,500,000 to assist the concern in carrying on its business, held a meeting in Philadelphia Dec. 26 to consider changes in the organization necessitated by the financial arrangement. In order to make places on the Board for representatives of the banking syndicate which advanced the loan, F. S. Lewis, W. P. Douglas, Edward C. Lee and James Butterworth resigned, and their places were filled by Charles Macdonald and Charles H. Tweed, of Speyer & Company, New York; Horatio Lloyd, president, and Thomas DeWitt Cuyler, vice-president, of the Commercial Trust Company of Philadelphia. Joseph S. Swartz, who has been a member of the Board for several years, was elected vice-president to fill the vacancy occasioned by the resignation of E. C. Lee.

Westinghouse Traction Brake Co.

The name of the Standard Traction Brake Co., of 26 Cortlandt St., New York City, has been changed to the Westinghouse Traction Brake Company. This company sells all power brakes for street railroad service made by The Westinghouse Air Brake Company, including straight or automatic air-operated brakes with axle-driven or motor-driven compressors, the storage system of air-brakes, and the Westinghouse combined magnetic brake and electric car-heating apparatus.

Alabama Steel & Wire Re-organized.

A certificate of organization of the Alabama Steel & Wire Corporation has been filed with the Secretary of State in Connecticut. The amount of capital stock authorized is $5,000,000 ,one-half of which is preferred stock. No cash has been paid thereon, but there have been acquired 6,963 shares each of the preferred and common stock of the Alabama Steel & Wire Company of Alabama. The officers are: President, F. T. Schuler, Gadsden, Ala.; Vice-President, G. H. Schuler, Birmingham, Ala.; Treasurer, George Van Zandt, Chicago, Ill.; Secretary, Ward B. Sawyer, Chicago, Ill.

Heavy Rails in Prussia.

For several years the Prussian State Railroads have used 84-lb. rails for renewals on lines which have a heavy traffic; but it is now determined to make the change when fast trains run without watching for the old rails to wear out.

A Voltmeter Patent Decision.

On Dec. 8 Judge Coxe in the United States Circuit Court for the Southern District of New York gave a decision in the case of the Weston Electrical Instrument Company against J. Franklin Stevens and Elmer P. Morris. This was an equity suit for infringement of two patents granted to Edward Weston. One is a re-issue for an electrical measuring instrument, dated June 28, 1892, the original being Aug. 5, 1890, the re-issue number being 11,250. The Judge in his decision describes the instrument and lays down the state of the art, saying that strictly speaking there is no prior art; that is, there were no practical

commercial instruments prior to Weston's, if the invention be confined to alternating current devices. The complainant is entitled to the usual decree for an injunction and an accounting. The following is an extract from the text of the decision:

"The infringement is clear. The defendants have copied the patented instrument even in its minute details. . . .

"It appearing, then, that Mr. Weston was the first to construct a commercial instrument to do this exceedingly important work and that the defendants have appropriated that instrument bodily, it may as well be admitted that the Court is not disposed to deprive the inventor of the fruits of his genius and perseverance by subjecting the patent to harsh and technical rules of construction. Few patents that come before the Courts are entitled to more liberal treatment. This is a case where, upon the undisputed testimony, the inventor has accomplished something which has been of unquestioned benefit to the electrical world. In an art crowded with indefatigable and brilliant enthusiasts he has made the only successful alternating current voltmeter in use at the present day. He alone has succeeded, even against the ablest competitors which England, France and Germany could produce."

THE SCRAP HEAP.

Notes.

A firm of tailors in Nashville has taken a contract to make all of the uniforms needed for the employees of the Louisville & Nashville, throughout the 3,452 miles of the company's lines.

The Pittsburgh (Street) Railways Co. distributed Christmas premiums to its conductors and motormen amounting to $30,000. These gifts are based on records of careful work and avoidance of accidents.

A press despatch from Williamsport, Pa., says that the Pennsylvania Railroad will pay gratuities to those of its employees who served in the militia during the coal strike. Most of the men were absent from their railroad posts about four months, and it is said that the gratuities will be equal to the wages lost.

The Standard Oil Company is to retire its old officers and employees on pensions. Any employee who has reached the age of 64 years, after 25 years in the service of the company, may retire on half pay for one year, after which the regulation pension is to be paid. The regular pension is to be one-fourth of the salary which the employee was receiving at the time of his retirement. It will be paid to all who have been in the service of the company for 25 years and who have reached the age of 65 years. The employees of the company number in the tens of thousands and are spread over all parts of the world.

The Krauss Engine.

The engine built by Krauss, of Munich, and exhibited at Paris with the little auxiliary driving wheel in the bogie is now running on the Palatinate Railroad in Germany, and is giving satisfaction after having had the auxiliary engine removed and being altered to a two-cylinder compound. The weight on the auxiliary driving wheels was too little to be of any use.

Opening for Railroad Material in Spain.

The Consul at Valencia writes: One of the most pressing commercial needs of this district is the construction of light railroads, to place the fertile fruit and wine districts of the Mediterranean coast in direct communication with the sea. The Compañia de Ferrocarriles de Alicante á la Marina has commenced work on a narrow-gage road, to connect Alicante with Villajoyosa (19 miles), to be prolonged ultimately along the coast to Denia. The company is exclusively Spanish, but rails and rolling stock will be purchased in the cheapest market. American manufacturers who have offers to make, or who desire particulars of the exact requirements of the road, should address the company direct—Compañia de Ferrocarriles de Alicante á la Marina, 19 Calle Serrano, Madrid.

The New Brunswick Station of the Pennsylvania.

Work will soon be begun on the new passenger station for the Pennsylvania Railroad at Albany street and Easton avenue, New Brunswick, N. J., to cost approximately $50,000. The station will be two stories, of terra cotta, brick, and stone trimmings. It will have a frontage of 100 ft. and a depth of 60 ft. Entrance will be had through Albany street. The main entrance hall will be 72 x 31 ft. The baggage room on the first floor will be 23 x 45 ft., with a large baggage elevator. The ticket office will be 21 x 24 ft. A wide tunnel will be provided for passengers from the entrance hall to the westbound station. The main waiting room on the second floor will be 50 x 40 ft. There will be three separate waiting and retiring rooms for women. A second baggage room on the track level will contain a telegraph office and telephone booths. A sidewalk of granolith will extend around three sides of the station.

Must Maintain an Unprofitable Station.

The Supreme Court of Louisiana has sustained the authority of the State Railroad Commission to order the Southern Pacific to maintain a station at Berwick, a place at which the road claims the business is unprofitable and which is only 2,100 ft. from another station (across the river). The court says that when the comfort and convenience of the people along the line of railroad was involved it is the duty of the Railroad Commission to determine the best methods and means of subserving public interests and rights and not incumbent on the railroad company or this court. The court further says:

"The mere reference of disputed issues between the parties to this court for adjudication was not intended to constitute it an "administrative" board revisory in character over the orders and conclusions of the commission. Our action is judicial, not administrative. It was not intended that we should substitute our judgment for that of the commission every time there is a dispute touching the particular place on the line of railroad where it would be best for the public interest that a station or a depot should be placed. To come successfully before this court the appellant must be able to point out some legal right of its own which has been infringed upon."

The commission, according to the decision, could not be compelled to locate "public comfort and conveniences" at a remunerative point on the railroad. The opinion of the United States Supreme Court in a similar case is quoted to show that a railroad cannot claim the right to earn, as an offset to other claims, a net profit on every mile section of its track. Another case is referred to where the rule is plainly enunciated that an order of a Railroad Commission cannot be overthrown by the courts as unreasonable because it may apply to a point on the railroad that is not remunerative. The decision says that the opinion of the district judge was exceptionally able and no error or fault in his conclusions could be found.

Disastrous Butting Collision at Wanstead, Ontario.

In a butting collision between the westbound Pacific express No. 5 and an eastbound freight train on the evening of Dec. 25, about 10 o'clock, at Wanstead, Ont., on the Sarnia Line of the Grand Trunk, 28 persons were killed, nearly all of them passengers, and 29 or more were injured. There was a thick snowstorm at the time and snow fell fast all night, and the injured persons suffered much from the cold. A train order directing these two trains to meet at Wanstead had been sent to Watford for the passenger train and to Wyoming for the freight. According to the newspaper accounts the passenger train arrived at Watford, and was stopped by the train order signal; the operator cleared the signal, and being asked by the conductor why he had done so, answered that a meeting order had been sent, but that it had been recalled. The operator, Andrew Carson, a man of experience, 46 years old, then wrote a clearance and gave it to the conductor, who at once proceeded with his train. Carson says that the despatcher, J. G. Kerr, of London, about six minutes after sending the order told him (Carson) to "bust" it, meaning destroy it. But, according to the despatcher's testimony before the Coroner, as reported in the newspapers on Dec. 30, what he said to Carson was, "Wait a minute, may bust it." Kerr had not withdrawn the order from the freight train, and the collision resulted. Carson, being called to the witness stand, said that he had not heard the word "may." The phrase "wait a minute" appears to have been abbreviated to "min." Train Despatcher Kerr is said to be a man of experience and good record.

A British Trade Union Decision.

An important English lawsuit affecting railroads has just been decided. The plaintiff was the Taff Vale Company, and the defendants were the trustees, the general secretary and the organizing secretary of the Amalgamated Society of Railway Servants. The action comes out of a strike in 1900 which caused the railroad much loss, and there have been various decisions arising from it, one of the previous ones being that a trades-union can be sued. In the present case there were three questions for the jury to answer: (1) Did the three defendents conspire to molest and injure the plaintiffs by unlawful means? Yes.

(2) Did they or any and which of them, unlawfully persuade the men whose notices had not expired to break their contracts? Yes, all of them.

(3) Did they or any and which of them authorize and assist in carrying out the strike by unlawful means? Yes, all of them.

The decision makes the defendants liable for damages, but it was arranged that the judge should hear the question of damages without a jury; this will come on later.

An African Transcontinental Railroad.

The official journal of Portugal published Nov. 29 a contract made by the government with Robert Williams, said to have been an intimate of the late Cecil Rhodes, to build a railroad from Benguella, a harbor on the west coast about 13 deg. south of the equator; eastward entirely across the Portuguese territory of Angola, a distance of nearly 900 miles. The company is to have no subsidy, and is even required to pay 5 per cent. of its receipts to the government; but on the other hand it is to have the exclusive right to work mines and utilize forests for the first ten years. This Portuguese territory at its south-

east corner is not far from the great Victoria Falls of the Zambesi River, and almost at the same time with the news of the above contract comes the announcement that the British South African Chartered Company has determined to build a line from Bulawayo northeast some 250 miles to the Victoria Falls, and thence northward to recently discovered copper and lead mines. This latter would be nearer the west than the east coast of Africa. An extension further northward would bring it through the broadest part of the Congo Free State, and west of Tanganyika and the other great lakes. It has heretofore generally been assumed that a further northward extension of the British South African lines would be east of the lakes and through German territory. The people who are building them, however, doubtless give little thought to a through line to Egypt, which could have no through traffic worth mentioning, but place their lines where they find a prospect of traffic in the country, which alone can support them. There is already a railroad open from Bulawayo to the Portuguese port of Beira, in latitude south 20 deg. on the east coast, so that the completion of lines already planned will leave but an insignificant gap between the two oceans, and it seems probable that both enterprises are parts of one plan. The account of the Portuguese contract does not say within what time the railroad across Angola is to be completed—a very important matter.

Torpedo Boat.

The torpedo boat "Wilkes," built by the Gas Engine & Power Company, of New York, has been finally accepted by the Secretary of the Navy.

LOCOMOTIVE BUILDING.

The Union Steel Co. is having two locomotives built at the Baldwin Works.

The Lehigh Valley has ordered 40 locomotives from the Baldwin Locomotive Works.

The Fort Smith & Western is having four locomotives built at the Rhode Island Works of the American Locomotive Co.

The Union R. R. (Pittsburgh) is having five locomotives built at the Pittsburgh Works of the American Locomotive Co.

The Fremont, Elkhorn & Missouri Valley is having 10 locomotives built at the Rhode Island Works of the American Locomotive Co.

The Hicks Locomotive & Car Works has orders for rebuilding locomotives from the Pittsburgh Coal Co. and the Paepcke Leicht Lumber Co.

The Oregon Railroad & Navigation Co. is having five compounds and one switch engine built at the Baldwin Locomotive Works for February, 1903, delivery.

The Lexington & Eastern has ordered three simple consolidation locomotives from the Baldwin Locomotive Works, for August, 1903, delivery. They will weigh 130,000 lbs, with 116,000 lbs. on the drivers.

The Pennsylvania Lines West of Pittsburgh have ordered 65 locomotives for the Southwest System. Thirty-four of these are to be Pennsylvania standard simple consolidation locomotives to be built as follows: Twenty-four at the Baldwin Works; four at the American Locomotive Co., and six at the company's own works at Altoona. Twenty-two will be E2A simple Atlantic locomotives from the Schenectady Works of the American Locomotive Co.; four will be B6 new type Pennsylvania standard six-wheel simple switching locomotives from the Altoona Works, and five will be Schenectady standard type switching locomotives, all to be delivered between January and August, 1903. The Pennsylvania standard simple consolidation locomotives weigh 193,500 lbs. on drivers; 22 x 28 in. cylinders; 56 in. drivers; Belpaire wide fire-box boiler, with working steam pressure of 205 lbs.; heating surface, 2,482 sq. ft.; 373 iron tubes, 2 in. in diameter and 164 in. long; fire-box 107 in. long and 66 in. wide; grate area, 49 sq. ft.; tank capacity, 7,000 gallons of water, 22,000 lbs. of coal. The Atlantic locomotives weigh 176,000 lbs., with 109,000 lbs. on drivers; 22½ in. cylinders; 80 in. drivers; Belpaire wide fire-box boiler, with working steam pressure of 205 lbs.; heating surface, 2,640 sq. ft.; 315 iron tubes, 2 in. in diameter, and 180 in. long; fire-box, 111 in. long and 72 in. wide; grate area, 55½ sq. ft.; tank capacity, 7,000 gallons of water and 22,000 lbs. of coal. The six-wheel switching locomotives weigh 170,000 lbs., 22 x 24 in. cylinders, 56 in. drivers; Belpaire wide fire-box boiler, heating surface, 2,270 sq. ft.; 290 iron tubes, 2 in. in diameter, 14½ ft. long; fire-box, 84 in. long and 66 in. wide; tank capacity, 4,500 gallons of water and 22,000 lbs. of coal. Details of Schenectady switching locomotives not yet definitely decided.

CAR BUILDING.

The American Car & Foundry Co. has miscellaneous orders for 131 cars.

The A. J. Peyton Co. is in the market for 250 box cars of 60,000 lbs. capacity.

The Vandalia has ordered 200 gondolas from the American Car & Foundry Co.

The Delaware & Hudson has ordered 10 coaches from the American Car & Foundry Co.

The Illinois Central has ordered 2,000 coal cars from the American Car & Foundry Co.

The Pennsylvania Gas & Coal Co. is having 200 freights built at the Pressed Steel Car Co.

The Shreveport & Red River Valley has ordered 100 flat cars from the American Car & Foundry Co.

The National Coal Co. is having five freights built at the Detroit Works of the American Car & Foundry Co.

The New York, New Haven & Hartford has ordered 25 coaches and 1,000 box cars from the American Car & Foundry Co.

The Evansville & Terre Haute is having a few coaches built at the Jeffersonville Works of the American Car & Foundry Co.

The Fort Smith & Western is having three coaches built at the Jeffersonville Works of the American Car & Foundry Co.

The Seaboard Air Line is reported to have ordered 1,000 box cars of 60,000 lbs. capacity from the South Baltimore Car Works. (Dec. 12, 1902.)

The New York, Philadelphia & Norfolk is having 150 Pennsylvania standard "XL" box cars, 100,000 lbs. capacity, with 80,000 lbs. capacity trucks, and 50 Pennsylvania standard class "GR" low-side gondola cars, 100,000 lbs. capacity, built at the Pressed Steel Car Co., Pittsburgh, Pa.

The New York Rapid Transit & Subway has awarded a contract to the Metal Plate Car & Lumber Company for the sheathing of 500 of its cars with copper sheathing in its natural color. The cars are to be ready for November, 1903, delivery. Two hundred will be built by the St. Louis Car Co., St. Louis, Mo.; 100 by the Wason Manufacturing Co., Springfield, Mass.; 100 by the John Stephenson Co., Elizabethport, N. J., and 100 by the Jewett Car Co., Newark, Ohio. For further description, see under Technical.

The New Orleans & Northeastern (Queen & Crescent) has ordered two coaches from the American Car & Foundry Co., for June, 1903, delivery. The coaches will be 58 ft. 4 in. long and 9 ft. 8 in. wide, and have wooden underframes. The special equipment includes: M. C. B. hammered iron axles, American Steel Foundries' bolsters, Kewanee brake-beams, M. C. B. cast-iron brake-shoes, Westinghouse air-brakes, Ajax lead lined brasses, Janney Buhoup couplers, Burrows' curtain fixtures, Dayton door fastenings, Barr vestibule improved narrow type doors, Janney Buhoup draft rigging, Baker heating system, McCord & Co.'s journal box lids, Pintsch gas light, Sherwin-Williams paint, Janney Buhoup platforms, standard shape XX tin roofs, Hale & Kilburn seats, Railway Steel Spring Co.'s springs, American Car & Foundry Co.'s trucks and McKee-Fuller 38 in. wheels.

The Vicksburg, Shreveport & Pacific (Queen & Crescent) has ordered three combination baggage and passenger cars from the American Car & Foundry Co., for June, 1903, delivery. The cars will be 56 ft. 8 in. long and 9 ft. 8 in. wide, and have wooden underframes. The special equipment includes: M. C. B. hammered iron axles, American Steel Foundries' bolsters, Kewanee brake-beams, M. C. B. cast-iron brake-shoes, Westinghouse air-brakes, Ajax lead lined brasses, Janney Buhoup couplers, Burrows' curtain fixtures, Janney Buhoup draft rigging, Baker and Gold steam heating system, M. C. B. malleable iron journal boxes, McCord & Co.'s journal box lids, Pintsch gas light, Sherwin-Williams Co.'s paint, Janney Buhoup platforms, standard shape XX tin roofs, Hale & Kilburn seats, Railway Steel Spring Co.'s springs, American Car & Foundry Co.'s trucks and McKee-Fuller 38-in, wheels.

The Alabama & Vicksburg (Queen & Crescent) has ordered four coaches, one combination baggage and passenger and two baggage cars from the American Car & Foundry Co., for June, 1903, delivery. The coaches will be 62 ft. 6 in. long, 9 ft. 8 in. wide, and 9 ft. 4¾ in. high. The combination car will be 56 ft. 8 in. long and 9 ft. 8 in. wide. The baggage cars will be 59 ft. 9 in. long, 9 ft. 8 in. wide and 9 ft. 5 in. high. All cars will have wooden underframes. The special equipment for all includes: M. C. B. hammered iron axles, American Steel Foundries' bolsters, Kewanee brake-beams, M. C. B. cast-iron brake-shoes, Westinghouse air-brakes, Ajax lead lined brasses, Janney Buhoup couplers, Burrows' curtain fixtures on coaches and combination car, Dayton door fastenings, Janney Buhoup draft rigging, Baker and Gold steam heating system, M. C. B. malleable iron journal boxes, McCord & Co.'s journal box lids, Pintsch gas light, Sherwin-Williams Co.'s paint, Janney Buhoup platforms on coaches and combination car, standard shape XX tin roofs, Hale & Kilburn seats for coaches and combination car, Railway Steel Spring Co.'s springs, American Car & Foundry Co.'s trucks and McKee-Fuller 38 in. wheels.

BRIDGE BUILDING.

AUSTIN, TEXAS.—The Granger, Georgetown, Austin & San Antonio, an extension of the Missouri, Kansas & Texas, will bridge the Colorado River at a point about three miles below Austin.

CASTORVILLE, TEXAS.—H. E. Haass, County Judge, will receive bids until Feb. 10, at Hondo, for one 250-ft. and two 100-ft. spans to be built over Medina River. Bids for steel and stone work will be received separately or together. S. A. Oliver, of Houston, Texas, is the engineer.

COLFAX, WASH.—The specifications for the combination bridge to be built over the North Palouse River below Codd's Dam, near Colfax, may be seen at this office. The steel span will be 128 ft. long. The bids on the North Palouse bridge will be opened Jan. 6.

CONNELLSVILLE, PA.—The Pittsburgh & Lake Erie Railroad is said to be contemplating the erection of an overhead bridge at Dickerson Run.

CRESTON, IOWA.—Bids are wanted until Jan. 5 at the office of the County Auditor for building all bridges required by Union County during the year 1903. Geo. Brotherton, County Auditor.

DEVIL'S LAKE, N. DAK.—Bids are wanted until noon of Jan. 6, addressed to E. S. Eich, County Auditor, for 11 steel bridges of various sizes.

ENON, OHIO.—Bids are wanted until 11 a. m., Jan. 27, by the County Auditor, Springfield, Ohio, for a 200-ft. steel bridge over Mad River at Enon. J. B. Crain, Chairman County Commissioners.

ESSEX, MASS.—Reports state that a steel bridge will be built at Main street.

HARRISBURG, PA.—The Board of Public Grounds and Buildings will open bids Jan. 14 for the construction of the new State bridge over the Shenango River at Pulaski, Lawrence County.

INDIANAPOLIS, IND.—The Indianapolis Northern Traction Co., controlled by George F. McCulloch, President of the Union Traction Co., has let a contract to the Indiana Bridge Co. for the various bridges.

IRONTON, OHIO.—For some time there has been a project for a railroad bridge over the Ohio River between Ironton, Ohio, and Ashland, Ky. It is now said that the Cincinnati, Hamilton & Dayton and the Chesapeake & Ohio railroads are jointly considering building this bridge and building short lines of extension.

KANSAS CITY, MO.—There have been numerous reports from Kansas City of late regarding bridges over the Missouri River. One report is that there is a probability of the Chicago, Milwaukee & St. Paul and the Wabash railroads uniting in bridging that river, as officers of both companies have recently been inspecting thereabouts. Another project is by the recently organized Kansas City & Clay County Toll Bridge Co., of which Chas. H. Holmes, a bridge contractor of Chicago, is President. Others interested in this project are P. A. Gibson, of Erie, Pa.; James Lynn, Wabash, Ind., and T. C. Alexander, of Kansas City. There was a bill before the last Congress authorizing a new bridge over the Missouri River at Kansas City which failed to pass. It may be in the interest of either of the above companies.

The Chicago, Rock Island & Pacific will need 15 steel bridges on the re-location of its line between Windsor and Kansas City, which is mentioned under "Railroad Construction."

KNOXVILLE, TENN.—We are told that bids will probably be wanted early in the summer for a steel bridge about 600 ft. long to cross the tracks of the Knoxville, Lafollette & Jellico and the Southern Ry. and Second Creek. The work will be done by the Department of Public Works of Knoxville. T. J. Moreland, City Engineer.

LOCKLAND, OHIO.—The County Commissioners will soon let a contract for the bridge over Mill Creek between Lockland and Reading, to cost $10,000.

MILWAUKEE, WIS.—It is probable that bids will be readvertised for the Muskego avenue bridge. The bonds to pay the cost are about to be sold and amount to $150,000.

The City Council has ordered bids advertised for a bascule bridge at West Water street.

OTTAWA, ONT.—The Ottawa, Brockville & St. Lawrence Ry. will require several bridges on its projected line. The largest will be across the Rideau River. E. J. Walsh, of Ottawa, may be addressed.

PHILADELPHIA, PA.—The following recommendations have been made by the Finance Committee of the Councils: Bureau of Highways, $15,000 for general repairs to bridges; Bureau of Surveys, $150,000 for new bridges, and $20,000 for rebuilding the bridges over Poquessing Creek on the line of Frankford avenue.

PITTSBURGH, PA.—Plans for the new bridge to be built over the Ohio River below Pittsburgh by the Western Bridge Co. have been made. The crossing will be between Allegheny and McKees Rocks, and it is understood the Pittsburgh Railways Co. is back of the project. The structure will be of steel and the middle or main span will be 900 ft. long, with a clearance 90 ft. above pool level.

PRESIDIO DEL NORTE, MEXICO.—According to the preliminary survey for the Kansas City, Mexico & Orient, the road will cross the Rio Grande at or near this village. The road will also need bridges over the Colorado, Concho and Pecos rivers.

PORTO RICO.—Governor Hunt has made arrangements to spend $88,000 in repairs to roads and bridges. The work will be carried on under the supervision of Superintendent A. Stierle of the Department of Public Works. The money allotted for bridge work includes painting two submerged bridges, one over the Anasco River, $8,500, and one over the Portuguese River, $4,200.

ST. CHARLES, MO.—The Iowa & St. Louis will build a bridge over the Missouri River here, on the extension mentioned under "Railroad Construction."

SIOUX CITY, IOWA.—Plans will soon be made by City Engineer Lewis for two bridges which must be built next year to replace present structures. They will be over Perry Creek, at the junction of West Third and Fourth streets and in Third street.

STANTON, NEB.—Bids are wanted until noon of Jan. 16 for furnishing all the material and building all bridges needed by Stanton County for the year 1903, beginning on Jan. 16. Albert Pilger, County Clerk.

STEUBENVILLE, OHIO.—A bridge is to be built over the Ohio from Market street by the Steubenville Bridge Co., which, it is said, will cost $300,000. James G. Mitchell, of Rochester, Pa., and James E. Newel, of East Liverpool, Ohio, are interested.

TRENTON, N. J.—A bridge will be built over the canal between the Trenton Fire Clay & Porcelain Company's works and the new plant of the Mott Iron Co.

Other Structures.

ANNISTON, ALA.—It is said that the plant of the Southern Car & Foundry Co. at Anniston, the ownership of which recently passed to the Standard Steel Car Co., of Pittsburgh, will be enlarged and improvements made to increase the capacity from 50 to 60 cars per day, 20 of which will have metal underframes. An inspection of the various plants of the Southern Car & Foundry Co. has recently been made by Mr. Hansen, President of the Steel Car Co., and it is also said that improvements are to be made to the other plants.

ATLANTA, GA.—Local papers contain plans of the proposed union passenger station which will be built adjoining the Mitchell street viaduct between Mangum and Madison streets. The station will be used jointly by the Southern and Central of Georgia.

BALTIMORE, MD.—A new machine shop will be built on Bush street for the Structural Steel & Iron Co.

BOWLING GREEN, KY.—The improvements which the Louisville & Nashville contemplates making at Bowling Green include a new passenger station with new sidings and yard facilities. It is said that the total cost of the improvements will reach $300,000.

BRIDGEPORT, CONN.—The Bullard Machine Tool Co. will build an additional factory 40 x 112 ft., and has let the contract to the Berlin Construction Co.

ELGIN, TEXAS.—The Texas Railroad Commission has ordered the Missouri, Kansas & Texas and Houston & Texas Central to build a joint passenger station at Elgin.

PEABODY, MASS.—The shops of the Vaughan Machine Works were destroyed by fire Dec. 25, causing a loss of about $100,000 to that concern.

VALLEY HEAD, ALA.—J. W. Dowling, for some years in charge of the Bessemer furnaces of the Tennessee Coal, Iron & Railroad Co., will be in charge of building the new furnaces of the Valley Iron Co. at Valley Head. Work was begun this week.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

American Association of Dining Car Superintendents.

The annual meeting of this Association will be held on Jan. 19 at 10 a.m., at the Hotel Imperial, Chicago, Ill. W. E. Myers, care Chicago & Alton Ry., Chicago, Ill., Secretary.

Rocky Mountain Railway Club.

At the September meeting W. H. Wallace, of the Burlington, read a paper on "Do Lifting Injectors Receive

Proper Attention." The other paper read at this meeting was on "The Importance of Maximum Loading of Cars," by G. W. Covert, also of the Burlington.

Canadian Railway Club.

The annual meeting of the Canadian Railway Club will be held on Tuesday evening, Jan. 6, at the Windsor Hotel, Montreal. At this meeting the election of officers and committees for the ensuing year will take place, immediately after which the annual dinner will be served.

Engineers' Club of Cincinnati.

The annual meeting of the club was held on the evening of Dec. 18 in the rooms of the Literary Club, with 18 members and several guests present. The following officers for the year 1903 were elected: President, A. O. Elzner; Vice-President, H. E. Warrington; Directors, Chas. H. Meeds, Frank E. Morris, Jas. A. Stewart; Secretary and Treasurer, J. F. Wilson. The retiring President addressed the club in a few appropriate remarks, and Mr. J. C. Lemon read a paper on "The Efficiency of a Specially Jacketed Engine." The usual annual supper was served before the meeting.

The Engineers' Club of Philadelphia.

A regular meeting of the club will be held on Saturday, Jan. 3, at 8 o'clock p.m. The paper will be "The Handling and Storing of Iron-Ore," illustrated, by Charles Piez.

At the meeting on Dec. 20 Mr. Henry S. Spackman presented a paper on "The Manufacture of Portland Cement from Marl and Clay," and illustrated his remarks by a series of views projected by the electric lantern. The paper consisted of a description of the natural deposits of marl and clay and of the method of manufacturing Portland cement by the wet process, with some details of a typical marl mill. The subject was discussed by Messrs. Herbert T. Grantham, James Christie, Eugene M. Nichols, Richard L. Humphrey and others.

Engineers' Club of St. Louis.

The 552nd meeting of the Engineers' Club of St. Louis was held at the rooms of the club, Dec. 3, 1902, at 8 p.m., with Vice-President Van Ornum in the chair. The Chairman announced that the executive committee had approved the report of the committee on prizes, and that he was pleased to announce the award of the annual prize to Mr. H. H. Humphrey for his paper entitled "Notes on the Use of Beaumont Oil as Fuel," read before the club April 2, 1902.

Mr. Russell, chairman of the committee on engineering index, made a report, which was received and filed. Further action on the recommendations was deferred until a later meeting. On account of leaving the city, Mr. D. W. Roper asked consent to withdraw his name from the ballot as a candidate for director. The name of Mr. W. G. Brennecke was proposed as a candidate for director.

The Chairman announced that the next order of business would be the reading of the annual reports of officers and standing committees. As the President of the Club was absent from the city, the annual report of the executive committee was not presented. It was voted to hold the annual banquet at the meeting on Dec. 17, 1902. The Chairman appointed Messrs. Zeller and Klander a committee on time and place, and Messrs. Flad and Layman a committee on programme.

Central Railway Club.

The annual meeting of the Club will be held at the Hotel Iroquois, Buffalo, N. Y., on Friday, Jan. 9, at 2 p.m. The executive committee meeting at the same place at 1 p.m.

In accordance with the decision of the November meeting, discussion of the paper of Mr. L. R. Pomeroy, of the General Electric Company, on "The Advantages of Electrically Driven Railroad Shops," will be continued.

Charles E. Lucke, Ph.D., of the Mechanical Engineering Department of Columbia University, has accepted an invitation to present a paper on "Steam Engine Indicators," which will be instructive and interesting.

This being the annual meeting of the Club, officers will be elected for the ensuing year. Candidates will be nominated and elected from the floor, in accordance with the amendments to the Constitution and By-Laws adopted at the September meeting. Immediately after the adjournment of the business session a luncheon will be served in the hotel dining room. The committee appointed to make the necessary arrangements consists of E. C. Neal, Chairman; H. C. Edson and B. M. Tate.

In consideration of the fact that some members are often prevented, by timidity or inability to attend meetings, from taking part in discussions, the executive committee desires to again invite them to contribute a written statement of their views, opinions and experience either upon a pending subject or some question they wish taken up by the Club.

PERSONAL.

—Mr. Francis Fowler, a Principal Examiner in the U. S. Patent Office in charge of the Division of Steam Appliances, died at his home in Washington, D. C., on Dec. 27, after a long illness. Mr. Fowler entered the Government service in 1869, becoming a Principal Examiner in 1876.

—Mr. James Leeming, General Freight Agent of the Erie Railroad, died at Buffalo, N. Y., Dec. 25. Mr. Leeming was born in Brantford, Ont., in 1857, and educated at the Brantford Collegiate Institute. His first railroad service was with the Grand Trunk as a clerk. He later went with the New York, Lake Erie & Western (Erie) as Assistant General Freight Agent, and in 1898 was promoted to the position he held at the time of his death.

—Mr. L. Ohliger, Superintendent of the Pennsylvania Company at Columbus, has come up through the train service on the Cleveland & Pittsburgh. He was made trainmaster of that division of the Pennsylvania Company in 1889, where he remained 10 years, when he was made Superintendent of the Cleveland & Marietta. In March, 1901, he was transferred to the Richmond Division as Superintendent, and on December 17 last assumed the Superintendency of the Indianapolis Division.

—Mr. M. J. Carpenter, the new Vice-President and General Manager of the Pere Marquette Railroad, was formerly President of the Chicago & Eastern Illinois. Mr. Carpenter was born at Caledonia, Ill., in 1850, and entered railroad service at the age of 19. He started with the Chicago, Milwaukee & St. Paul, and has since been with different companies in various positions until he assumed the Division Superintendency of the Chicago, St. Paul & Kansas City. He was later appointed General Manager of the Duluth & Iron Range, finally becoming its President.

—Mr. C. R. Hudson, who has just become Traffic Manager of the Mexican Central, was born in 1860. From 1876 to 1887 he held minor positions on various lines and in the last named year (1887) he was appointed General Freight and Passenger Agent of the New Mexico & Arizona. Then for one year (1889-1890) he was Vice-President of the Rio Grande & El Paso, and in January, 1890, he became Assistant General Freight Agent of the Atchison, Topeka & Santa Fe, from which position he resigned to go with the Mexican Central as General Freight and Passenger Agent. Mr. Hudson assumed his new duties on Dec. 1.

—On Dec. 1, Mr. H. A. Lyddon was appointed Superintendent of the Gladstone shops of the Northern Pacific. He was born in England in 1864. He entered the service of the London, Chatham & Dover Railway as an apprentice, where he remained seven years, during which time he studied mechanical drawing and applied mechanics. In 1886 he left England and accepted a position as gang boss on the Canadian Pacific at Winnipeg, Canada. In 1887 he took a position with the Northern Pacific as machinist, later working in the drawing office as a draftsman, and in 1893 was appointed chief draftsman of the locomotive department. In February, 1896, he was appointed General Foreman at North Dakota, but was later transferred to Brainerd in the same capacity, where he remained until April, 1902. He then became Master Mechanic of the Minnesota Division, which position he now resigns to become shop Superintendent.

—Mr. Herbert T. Herr, Master Mechanic of the Eastern General Division of the Norfolk & Western Railway at Roanoke, Va., is a native of Colorado. He was born in Denver in 1876, and after graduating from the East Denver High School in 1895, he went with the Chicago & North Western as an apprentice. The following year he entered Yale University (Sheffield Scientific School), graduated in 1899. During the summer vacations of 1897 and 1898 Mr. Herr was with the Denver & Rio Grande, and for about three months in 1899 was inspector of rails. In July, 1900, he was appointed Division Master Mechanic of the Southwest Division of the Chicago Great Western Railway at Des Moines, and the following December became Mechanical Engineer at St. Paul; then from March last year to March, 1902, he was Division Master Mechanic of the Northwest Division. At the time of his new appointment Mr. Herr was Division Master Mechanic of the Atchison, Topeka & Santa Fe at Fort Madison, Iowa.

—Mr. Alfred W. Gibbs is appointed General Superintendent of Motive Power of the Pennsylvania Railroad to succeed Mr. Atterbury, who is appointed General Manager. Mr. Gibbs attended the Rutgers College Grammar School, took the freshman year at Rutgers College and graduated from the Stevens Institute of Technology with the class of 1878. From March, 1879, until June, 1881, he was a special apprentice in the shops at Altoona, and then served as draughtsman on the Richmond & Allegheny and Richmond & Danville, as Master Mechanic on the Atlanta & Charlotte Division, as Superintendent of Motive Power on the Central Railroad of Georgia, and as Assistant Superintendent of Motive Power on the Richmond & Danville. In July, 1893, he went back to Altoona as Assistant Mechanical Engineer of the Pennsylvania Railroad, where he remained until September, 1902, when he became Superintendent of Motive Power of the Philadelphia, Wilmington & Baltimore Railroad. His appointment as General Superintendent of Motive Power takes effect Jan. 1. Mr. Gibbs is very well known to railroad officers of the mechanical departments through his valuable work at Altoona and his contributions to the discussions of the Master Mechanics' Association. He long ago made for himself a position in the best class of technical railroad officers and we wish for him great success in the arduous administrative position which he now takes up.

ELECTIONS AND APPOINTMENTS.

Atlanta & West Point.—W. N. Cox has been appointed Acting Superintendent, with headquarters at Montgomery, Ala.

Central of New Jersey.—W. G. Besler has been elected a Vice-President, with the title of Vice-President and General Manager, with headquarters at New York city.

Chicago & Eastern Illinois.—A. M. Smith, Secretary and Auditor, with headquarters at Chicago, Ill., has resigned.

Chicago & North Western.—E. W. Pratt, Division Master Mechanic, with headquarters at Mason City, Iowa, has resigned. (See Fremont, Elkhorn & Missouri Valley.)

Chicago, Rock Island & Pacific.—D. G. Reid has been elected Chairman of the Board of Directors, succeeding R. R. Cable, resigned.

Cincinnati, Georgetown & Portsmouth.—E. W. White, General Manager, with headquarters at Cincinnati, Ohio, has resigned, effective Dec. 31.

Cincinnati, Lebanon & Northern.—The property of the Middletown & Cincinnati Railroad having been acquired by the C., L. & N., has since Jan. 1, 1903, been operated as part of the C., L. & N., and the jurisdiction of the officers of this Company has been extended over the line acquired.

Colorado & Southern.—J. M. Herbert, heretofore Manager of the Denver & Rio Grande, has been appointed Vice-President and General Manager of the C. & S., with headquarters at Denver.

Delaware, Lackawanna & Western.—T. S. Lloyd, Superintendent of Motive Power and Machinery, will also assume the duties of Master Car Builder.

Denver & Rio Grande.—J. A. Edson, heretofore General Manager of the Kansas City Southern, has been appointed Manager of the D. & R. G., succeeding J. M. Herbert.

Erie.—D. Fairchild, Division Engineer, with headquarters at Buffalo, N. Y., has resigned.

Fort Smith & Western.—K. P. Alexander has been appointed Master Mechanic, with headquarters at Fort Smith, Ark.

Fremont, Elkhorn & Missouri Valley.—E. W. Pratt, heretofore Division Master Mechanic of the Chicago & North Western, has been appointed Master Mechanic of the F., E. & M. V., with headquarters at Missouri Valley, Iowa, effective Jan. 1.

Interurban Rapid Transit Company.—Frank Hedley, of Chicago, has been appointed General Superintendent, with headquarters at New York city, effective Jan. 15.

Kansas City Southern.—B. F. Dickson, heretofore Engineer of Maintenance of Way, will, with the title of General Superintendent, assume the duties formerly discharged by General Manager J. A. Edson. (See Denver & Rio Grande.)

Louisville & Nashville.—The Directors of this company are: A. Belmont, M. H. Smith, A. Cox, W. G. Raoul, J. L. Waterbury, W. G. Oakman, G. M. Lane, R. G. Erwin, H. Walters, W. Delano, Jr., W. G. Elliott, M. Jenkins and D. P. Kingsley. The last six named gentlemen were recently elected to the Directorate.

Mexican Central.—H. Lawton has been appointed General Freight Agent, and F. L. Wemple, Assistant General Freight Agent. The office of Assistant General Passenger Agent has been abolished.

Mobile & Ohio.—J. F. Enright, heretofore Master Mechanic of the Atlantic Coast Line, has been appointed Master Mechanic of the M. & O., with headquarters at Whistler, Ala.

New York Central & Hudson River.—George H. Stevens, heretofore Assistant General Superintendent, has been appointed Superintendent of Special Freight Service, with headquarters at Buffalo, N. Y.

J. P. Bradfield, heretofore Division Superintendent at Buffalo, N. Y., has been appointed Assistant General Superintendent, with headquarters in New York city.

Northern Central.—(See Philadelphia, Baltimore & Washington.)

Oregon Short Line.—John P. Congdon, heretofore Acting Division Engineer, has been appointed Division Engineer, effective Jan. 1.

Pennsylvania.—J. K. Stewart, heretofore Supervisor, has been appointed Assistant Engineer, with headquarters at W. Philadelphia, Pa., succeeding L. T. Ford.

Pere Marquette.—F. H. Prince has been elected President.

Philadelphia, Baltimore & Washington.—J. Milliken, heretofore Master Mechanic of the Northern Central, has been appointed Superintendent of Motive Power, with headquarters at Philadelphia, Pa., succeeding A. W. Gibbs.

Pine Bluff & Western.—C. Green has been appointed Auditor and C. H. Brown General Freight and Passenger Agent, effective Jan. 1.

Rio Grande, Sierra Madre & Pacific.—L. P. Atwood, heretofore Engineer of Maintenance of Way, with headquarters at El Paso, Texas, has been appointed Superintendent.

St. Louis, Memphis & Southeastern.—J. R. Hawkins has been appointed Superintendent of the Memphis Division, with headquarters at Caruthersville, Mo., succeeding W. G. Tiffany, resigned. W. W. Fagan succeeds Mr. Hawkins as Superintendent of the St. Louis Division at Genevieve, Mo., effective Dec. 20. H. C. Sprague has been appointed Superintendent of Telegraph, with headquarters at Springfield, Mo., effective Jan. 1.

Southern Pacific.—Charles H. Tweed, Chairman of the Board and Second Vice-President, has resigned, effective Jan. 1. Mr. Tweed will on that day become a partner in the firm of Speyer & Company.

Tennessee Central.—Wm. N. McDonald has been appointed Chief Engineer of the T. C., succeeding Gus Bottinger. R. E. Harwood succeeds Mr. Bottinger as Chief Engineer of the Construction Company. W. H. Fox has been appointed Assistant to the General Manager of the T. C. R. R.

R. J. Farrell, Master Mechanic, with headquarters at Nashville, Tenn., has resigned.

Terminal R. R. Association of St. Louis.—E. Dunlop, Superintendent, with headquarters at St. Louis, Mo., has resigned.

Wabash.—H. W. Ashley, of Toledo, has been appointed Assistant to the President in the operative department of this company and the Ann Arbor, and E. B. Pryor becomes Assistant to the President in the executive department. These offices are newly created.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALBANY & HUDSON ELECTRIC.—Press reports state that this road will build a double track from Rensselaer to Kinderhook, N. Y., a distance of 17 miles.

ARKANSAS, SPRINGFIELD & NORTHWEST.—A line is being located between Jefferson City, Mo., and Little Rock, Ark., a distance of 260 miles. Construction will begin at an early date. H. C. Solomon is President.

BENNINGTON & HOOSICK VALLEY (ELECTRIC).—This company announces that the following extensions will be built at once: Hoosick Falls to Williamstown, 14 miles; Troy to North Hoosick, 26 miles; Eagle Bridge to Greenwich, 16 miles. Surveys are completed. The line as now worked runs from Bennington to Hoosick Falls, 16½ miles. Geo. E. Greene, of Hoosick Falls, N. Y., is President.

BLACKSTONE & SOUTHERN.—Press reports state that the surveys for the connection between Blackstone and the Seaboard Air Line have been completed. There are two proposed routes, one by way of Darvills, and the other by way of Westboro. W. A. Laird, of Blackstone, Va., is Chief Engineer.

BUCKHANNON & NORTHERN.—An officer writes that this road will be built from the terminus of the Green County R. R. at a point on the Monongahela River, through Morgantown to Fairmont; thence up the Tygart's Valley River through Grafton to the mouth of the Buckhannon River. A connection will be made at the latter place with the Burnsville & Eastern. The total length of the road will be about 70 miles. No definite plans have yet been given out.

CANADIAN NORTHERN.—During the year 1902 about 77 miles of track have been laid on branch roads in Manitoba, and 40 miles in the Northwest Territories. Three hundred and fifty miles of grading has also been completed.

CAPE FEAR & NORTHERN.—An officer writes that a line is building between Angier, N. C., and South, a distance of 15 miles. A. & C. Wright, Angier, N. C., are the contractors.

CHARLOTTE, FARMVILLE & JAMES RIVER VALLEY.—This line will run from Rosney to Danville, Va., about 100 miles. Work will probably be begun early in January. G. W. Miles, of Radford, Va., is Chief Engineer.

CHICAGO, ROCK ISLAND & PACIFIC.—An officer writes that the re-location of the line from Windsor to Kansas

City via Leeton, Chilhowee, Pleasant Hill, Lees Summit and Graytown, is now building. The Stubbs, Flick & Johnson Construction Co. are the contractors. One hundred and seventy-eight miles have been graded and track has been laid on 115 miles. The work to be done is heavy and will include 15 bridges.

Columbia River & Northern.—An officer writes that grading is now completed from Lyle to Goldendale, Wash., 45 miles. Track laying is in progress. E. Oliver, Lyle, Wash., may be addressed.

Connellsville Central.—The contract for 12 miles of road to be built from Buffington down Dunlap's Creek to Brownsville, Pa., has been let to John R. Bennett. The new line will connect with the Monongahela at Brownsville; and with the Masontown & New Salem at Buffington.

Danville & Bloomsburg (Electric).—Right of way has been secured by this road along the towpath of the old canal between these two cities. The distance of the new line will be about 10 miles.

Delaware & Hudson.—It is reported that work on standard gaging the Chateaugay tracks will be begun very shortly. Double track will be laid from Cadyville to Lyon Mountain, a distance of 22 miles.

Denver, Northwestern & Pacific.—Contracts for the first 36 miles of this road out of Denver are reported let by the Colorado-Utah Construction Co., to Orman & Crook, of Pueblo; G. S. Good & Co., of Lock Haven, Pa. Work will begin within a fortnight. (Dec. 5, p. 933.)

Eastern of New Mexico (Atchison, Topeka & Santa Fe).—This company has been incorporated in California. A map of the proposed route from Rio Puerco, on the Santa Fe Pacific, to Texico, N. Mex.; on the Pecos Valley & Northeastern may be found in our issue of Nov. 14, p. 882. President Ripley and other officers of the Atchison, Topeka & Santa Fe are among the directors.

Eau Claire, Chippewa Falls & Northeastern.—Work on the branch of this road on the east side of the Yellow River has been abandoned.

El Paso & Southwestern.—Surveys are reported on the new cut-off from Forest, a point 11 miles west of Douglass, to Naco. This new route will do away with several long curves, and evade the heavy grade between Douglass and Naco.

Feather River-Crescent Mills (California).—Articles of incorporation for this road were filed in California on Dec. 15. The projected route is from a point on the Feather River along Indian Creek to Crescent Mills. H. H. Yard, of Bellmar, N. J., and Carlton Gray, of Oroville, Cal., are directors.

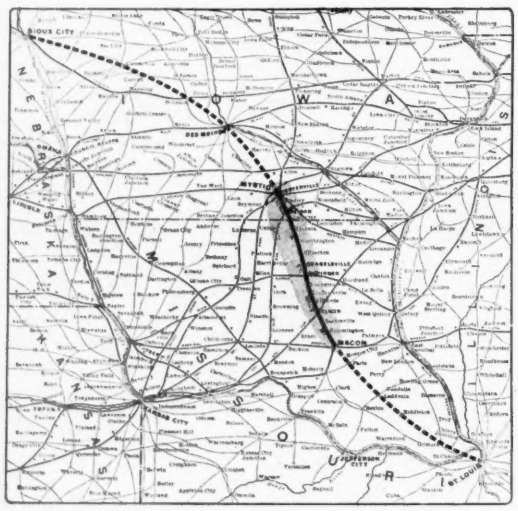
Fitchburg, Nashua & Lowell.—This company has filed a petition to build through the towns of Fitchburg, Lunenburg, Townsend, Shirley, Groton, Dunstable, Westford and Chelmsford, all in Massachusetts.

Granger, Georgetown, Austin & San Antonio.—An officer writes that a line is now building from Granger to Georgetown, a distance of 20 miles. Contract for grading has been let to Chas. McSweeney, Houston, Texas. One mile of track has been laid. A. A. Allen is President, and J. W. Petheram, Dallas, Texas, is Chief Engineer.

Gulf & Ship Island.—An officer writes that the proposed line out of Mendenhall will leave the main line 1½ miles north of Mendenhall and run through Burnham's Mill, Westville, Shivers, Hebron, Grange and Silver Creek, a total distance of about 29½ miles. No track has as yet been laid but grading has commenced. The work will be light and will include three or four trestles 200 ft. in length. It will be done chiefly by the company's own forces.

Intercolonial.—An officer writes that the Murray Harbor branch of the Prince Edward Island Railway, extending from Charlottetown to Murray River, 44½ miles, is under contract to Willard Kitchen, Murray River, and M. J. Haney, Charlottetown.

Iowa & St. Louis.—An officer writes that the road between Centerville, Iowa, and Macon, Mo., 83 miles, has been completed. The line from Macon to St. Louis, a distance of 125 miles, is under contract and grading



will begin at once. The line from Centerville to Sioux City, about 200 miles, is also to be graded immediately. The work will be fairly light and only one bridge, crossing the Missouri River at St. Charles, will have to be built. The accompanying map shows work completed and in progress.

Kansas City & Rock Island.—Charter was granted this company on Dec. 23. The road is to extend from Kansas City to Strassburg, a distance of 40 miles. W. B. Leeds, of New York, and M. E. Farrow, of St. Louis, are among the incorporators.

Knoxville, Lafollette & Jellico.—Contract for the Oliver Springs section of this road, which was reported let to the Callahan Construction Co. in our last issue, has been sub-let to J. R. Oates, of Nashville, Tenn.

La Crosse Southwestern.—This company has filed articles of incorporation in the State of Michigan. D. H. Palmer, E. C. Higbee, of La Crosse, and F. A. Cummings and James Turner, of Chicago, are among the incorporators.

Lake Shore Traction (Electric).—Franchise has been granted this road to build from Buffalo to Westfield, N. Y., a distance of 65 miles. The company was incorporated in 1901. It is said that work will be commenced immediately.

Leslie & Southern.—This company has been granted a charter in the State of Arkansas. The proposed route is from Leslie, Ark., to Little Rock, a distance of 120 miles. S. W. Lee, of Harrison, Ark., is Chief Engineer.

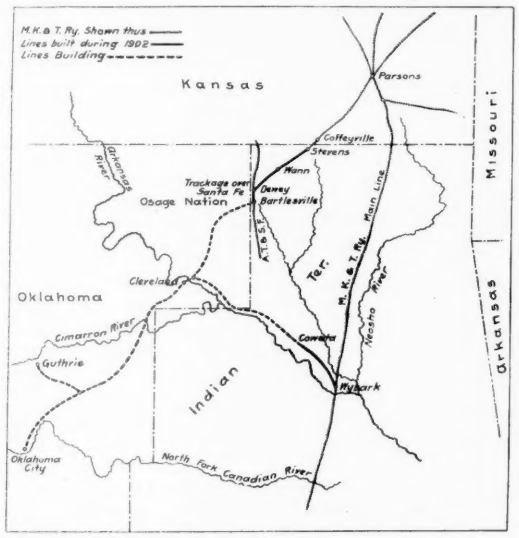
Louisville & Nashville.—An officer writes that the following work has been done during the past year: Extension from Blacks, Ala., to Graceville, Fla., 14½ miles; extension from Thomaston to Myrtlewood, 15¾ miles; new line from Gurley Junction to Lehigh, Ala., 7½ miles long; extension of Middlesboro railroad to coal mines, six miles; new Selma-Sardis branch, 7½ miles long. The following lines are under contract: Thirty miles between Hughes Siding and Warrior River, Contractors Dunn & Lallande Bros., of Birmingham, two miles of track already laid; 23 miles between Talladega and Pyriton, grading contract let to Donnelson Construction Co., and T. B. Redmond; 22 miles between Opp and Flarala, under contract to J. M. Sullivan, Montgomery, Ala.

Malad Valley.—An officer writes that the proposed route of this road is from Corinne, Utah, to Malad City, Idaho, a distance of 40 miles. No track has as yet been laid but contracts for grading will be let next month. W. H. Bancroft, of Salt Lake City, is President.

Mason City & Fort Dodge.—An officer writes that track has been laid between Fort Dodge and Botna, a distance of 70 miles. Sixty-two miles will be built during the coming year to Council Bluffs, Iowa.

Mexican Central.—An officer writes that the following extensions were completed during the year 1902: Dynamite Spur to Colon, six miles; Sulphur branch to Sulphur Mines, three miles; San Pedro extension, 40 miles; Los Reyes extension, 12 miles, and the Rio Verde extension, two miles.

Missouri, Kansas & Texas.—The estimate of mileage printed in our issue of Dec. 26 shows that the following work has been completed during the year by this road: Mineral to Joplin, Mo., 23 miles; Missouri State



line to Joplin, 5½ miles; the largest piece of work from Stevens, Ind. T., to Oklahoma City, has been completed to Bartlesville and graded as far as Guthrie, Okla. T. The accompanying map shows the work completed and in progress.

Natchez & Southern.—This company has recently been organized in Mississippi to build from Natchez to New Orleans. E. C. Marion is President.

Ohio Connecting.—The stockholders have voted to increase the capital stock of this company from $1,000,000 to $2,000,000. Double track will be built along the entire route with the exception of the bridge across the Ohio River. Contracts for additional grading and second track will be awarded some time in January.

Ottawa, Brockville & St. Lawrence.—Contract for the new line from Ottawa to Brockville, Ont., 55 miles, will be let early in the spring. E. J. Walsh, of Ottawa, is in charge of the surveys which are now being made. (Dec. 12, p. 954.)

Pennsylvania Roads.—Surveys are now completed for the new line which the Jones & Laughlin Steel Co. propose to build from Pittsburgh to Geneva Harbor, Lake Erie. Work will be begun as soon as rights of way have been secured.

Republic & Kettle Valley.—An officer writes that the road from Danville to Republic, Wash., 36 miles, has been completed. No new work is projected at present.

St. Louis & Gulf.—Contracts for the proposed cut-off in Dunklin County, Mo., from Bloomfield to Campbell, 35 miles, have been let to McArthur Bros., of Chicago. The sub-contract is let to Corrall Bros. Construction Co. This cut-off will save seven miles.

Southern Indiana.—An officer writes that surveys are now in progress from Elnora to Evansville, Ind., a distance of 80 miles. This line will be built in 1903. The reports that it is projected to Chicago are without foundation.

Southern Pacific.—This company is negotiating for right of way for a new cut-off between Sunnyvale, near Palo Alto, and Los Gatos, a distance of 10 miles. The projected route will reduce the time between Los Gatos and San Francisco about 30 minutes.

Susquehanna & New York.—Contracts are reported let for building the new road from Laquin to Ralston, Pa., making a connection with the Northern Central at the latter place. This new road will make a direct route between Towanda and Harrisburg.

Toledo, Port Clinton & Lakeside (Electric).—This road has been incorporated in Ohio. The projected route is from Toledo to Lakeside, passing through Lucas and Ottawa Counties, a distance of about 15 miles. D. H. James, of Toledo, is said to be interested.

Tuxpan Valley (Mexico).—E. B. Eames, of St. Louis, Mo., has made an application to the Mexican Government for a concession to build a road through the Tuxpan Valley, to connect at Tampico with the new line of the Mexican Central, which is building between Tampico and the City of Mexico.

Valdosta-Douglass (Georgia).—It is proposed to build between these two points, a distance of 60 miles. The Valdosta Construction Co. is behind the project, and W. S. West, of Valdosta, Ga., may be addressed.

Velasco, Brazos & Northern.—An amendment to the charter of this company has been filed at Austin, Texas. It provides for an extension of the road from its present terminus at Anchor, to a point on the Gulf, Colorado & Santa Fe, either Navasota or Stoneham, a distance of 50 miles.

White River.—This company has filed articles of incorporation in Arkansas and will build from Mount Olive, Ark., northwest to a connection with the Lexington & Southern at Carthage, a distance of about 124 miles. G. E. Dodge, of Little Rock, is President. Geo. J. Gould, of New York, is one of the directors.

Wichita Valley.—An extension from Wichita Falls to Charlie, a distance of 20 miles, is projected. It is also stated that a line will be built from Seymour to Sweetwater, Texas, a distance of about 100 miles, where connection will be made with the Texas & Pacific and Kansas City, Mexico & Orient. Morgan Jones, of Wichita Falls, is President. (July 4, p. 544.)

GENERAL RAILROAD NEWS.

Charlestown, Clendennin & Sutton.—This road, which runs from Charleston, W. Va., northwest to Big Otter, a distance of 65 miles, has been sold to Senator D. Davis. An extension to Beverly to connect with the Virginia Central is projected. H. Walker, Jr., of Pittsburgh, and S. L. Harriman, Philadelphia, are directors.

Chateaugay.—Beginning Jan. 1, 1903, the Delaware & Hudson Company will assume the management and operation of the Chateaugay Railroad extending from Plattsburgh, N. Y., to Lake Placid, N. Y., a distance of 83 miles, which will hereafter form a part of the Champlain Division.

Ellenville & Kingston (New York, Ontario & Western).—This road was completed on Dec. 15, and is now in operation. It runs between Ellenville and Kingston, a distance of 27¼ miles, and connects with the Port Jervis, Monticello & New York at Port Jervis.

Fonda, Johnstown & Gloversville.—This road has recently been consolidated with the Cayadutta Electric and the Amsterdam Street Ry. The new company will continue under the old name. J. L. Hees, of Fonda, N. Y., is President.

Indianapolis & Northwestern.—The Indianapolis, Lebanon & Frankfort Traction Company has filed notice with the Secretary of State, changing its name to the Indianapolis & Northwestern Traction, and increasing its capital from $25,000 to $2,500,000. The President is George Townsend, of Indianapolis. The road will be completed by Dec. 1, 1903.

Interstate (Electric).—The United Power & Transportation Company has been sold to the Interstate at $75 a share, payable in 40-year gold coupon bonds to be issued by the purchasing company. Bonds will be dated Feb. 1, 1903, and will bear interest at the rate of 3 per cent. for the first year; 3½ per cent. for the second year, and 4 per cent. for the third year and thereafter. This company was recently incorporated in New Jersey with a capital of $10,000,000 to control and operate electric lines in Pennsylvania, New Jersey and Delaware. (Dec. 26, p. 992.)

New York & Hoboken Ferry.—Sale of the Hoboken Ferry and its properties is reported. The name of the purchaser has not been made public, but the Delaware, Lackawanna & Western is thought to be interested. The company operates ferries from Barclay street, Christopher street and Fourteenth street and owns some valuable dock property.

Ohio Connecting.—See Railroad Construction.

Omaha & Council Bluffs.—Deeds of conveyance were filed in Omaha Dec. 24 making the formal transfer of the properties of the Omaha Street Railway Company to the Omaha & Council Bluffs Street Railway Company. The following lines are projected: Omaha to Blair, Omaha to Fremont, Omaha to Lincoln, Omaha to Griswold, Iowa, and Omaha to Plattsmouth. J. W. Seligman, Bankers, New York, are said to be behind the project.

Reading.—Notice has been issued that this company will purchase the general mortgage 7 per cent. bonds of the North Pennsylvania, due Jan. 1, 1903. An option was offered the bondholders last year to extend their holdings from Jan. 1, 1903, to Jan. 1, 1953, and a good many will exercise this privilege. The remaining bonds will be paid off.

St. Joseph & Grand Island.—At a meeting of the Directors held Dec. 23 it was decided that in view of the rebuilding of the bridge at St. Joseph, Mo., and the necessity of additional equipment, no dividend be declared on the first preferred stock. A semi-annual dividend of 2½ per cent. on the first preferred has previously been paid without interruption since the company was incorporated in 1898.

Savannah & Statesboro.—Directors of this road have authorized a bond issue of $500,000. The proceeds are to be used for an extension 20 miles long from Statesboro in the direction of Swainsboro, Ga. Cecil Gavett, of Savannah, is President.

Susquehanna Tidewater.—This new company has been formed by the consolidation of the Susquehanna & Tidewater and the Baltimore & Hartford. It is proposed to build along the west bank of the Susquehanna River, between Havre de Grace and Wrightsville, Pa. M. H. Houseman, Baltimore, is President.

Weatherford, Mineral Wells & Northwestern.—A mortgage for $1,354,000 has recently been made by this company with the Continental Trust Co., of New York. New 5 per cent. bonds, due in 1930, are to be issued, interest payable semi-annually. Geo. J. Gould is President.